SEQUENCE LISTING

<110> Han, Hui-Quan
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<120> Human E3 Alpha Ubiquitin Ligase Family

<130> 01017/35966A

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<210> 1
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gatcagctgc ttgctgctgc catcttatcc gcttctgcct gttctgagta aatgtataca     300

caccctggaa accaccattc tactttctgt gtctatgaat ttgactactc tagctggatc     360

ccgagctttt ttgtacacat gtgcaagtgc ccacggggta gaatcctaaa aatagaagat     420

gtatgcaaca gttcccagca ccaaacccag atatacaacc attcagctac caagagctac     480

gcctgataaa ttagagggga aaaaaaaaat ctccagtccc ttcacgtcgt gacgcttgct     540

tccgggaagc gggccggaag ccactcctcg agtctgcgtc aaacccgact tcaggggccg     600

tcgtaaaagt gtcgtccctg tctctccgac cggccacagg tttccgcttg cctctggccg     660
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ggggtcggca actgcaggcg tcagtttccc tcaag atg gcg gac gag gag gct      713
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gga ggt act gag agg atg gaa atc agc gcg gag tta ccc cag acc cct      761
Gly Gly Thr Glu Arg Met Glu Ile Ser Ala Glu Leu Pro Gln Thr Pro
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cag cgt ctg gca tct tgg tgg gat cag caa gtt gat ttt tat act gct      809
Gln Arg Leu Ala Ser Trp Trp Asp Gln Gln Val Asp Phe Tyr Thr Ala
        25               30                  35
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-1-

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ttc ttg cat cat ttg gca caa ttg gtg cca gaa att tac ttt gct gaa    857
Phe Leu His His Leu Ala Gln Leu Val Pro Glu Ile Tyr Phe Ala Glu
    40              45              50

atg gac cca gac ttg gaa aag cag gag gaa agt gta caa atg tca ata    905
Met Asp Pro Asp Leu Glu Lys Gln Glu Glu Ser Val Gln Met Ser Ile
55              60              65              70

ttc act cca ctg gaa tgg tac tta ttt gga gaa gat cca gat att tgc    953
Phe Thr Pro Leu Glu Trp Tyr Leu Phe Gly Glu Asp Pro Asp Ile Cys
            75              80              85

tta gag aaa ttg aag cac agt gga gca ttt cag ctt tgt ggg agg gtt    1001
Leu Glu Lys Leu Lys His Ser Gly Ala Phe Gln Leu Cys Gly Arg Val
            90              95              100

ttc aaa agt gga gag aca acc tat tct tgc agg gat tgt gca att gat    1049
Phe Lys Ser Gly Glu Thr Thr Tyr Ser Cys Arg Asp Cys Ala Ile Asp
        105             110             115

cca aca tgt gta ctc tgt atg gac tgc ttc cag gac agt gtt cat aaa    1097
Pro Thr Cys Val Leu Cys Met Asp Cys Phe Gln Asp Ser Val His Lys
        120             125             130

aat cat cgt tac aag atg cat act tct act gga gga ggg ttc tgt gac    1145
Asn His Arg Tyr Lys Met His Thr Ser Thr Gly Gly Gly Phe Cys Asp
135             140             145             150

tgt gga gac aca gag gca tgg aaa act ggc cct ttt tgt gta aat cat    1193
Cys Gly Asp Thr Glu Ala Trp Lys Thr Gly Pro Phe Cys Val Asn His
            155             160             165

gaa cct gga aga gca ggt act ata aaa gag aat tca cgc tgt ccg ttg    1241
Glu Pro Gly Arg Ala Gly Thr Ile Lys Glu Asn Ser Arg Cys Pro Leu
            170             175             180

aat gaa gag gta att gtc caa gcc agg aaa ata ttt cct tca gtg ata    1289
Asn Glu Glu Val Ile Val Gln Ala Arg Lys Ile Phe Pro Ser Val Ile
            185             190             195

aaa tat gtc gta gaa atg act ata tgg gaa gag gaa aaa gaa ctg cct    1337
Lys Tyr Val Val Glu Met Thr Ile Trp Glu Glu Glu Lys Glu Leu Pro
    200             205             210

cct gaa ctc cag ata agg gag aaa aat gaa aga tac tat tgt gtc ctt    1385
Pro Glu Leu Gln Ile Arg Glu Lys Asn Glu Arg Tyr Tyr Cys Val Leu
215             220             225             230

ttc aat gat gaa cac cat tca tat gac cac gtc ata tac agc cta caa    1433
Phe Asn Asp Glu His His Ser Tyr Asp His Val Ile Tyr Ser Leu Gln
            235             240             245

aga gct ctt gac tgt gag ctc gca gag gcc cag ttg cat acc act gcc    1481
Arg Ala Leu Asp Cys Glu Leu Ala Glu Ala Gln Leu His Thr Thr Ala
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att gac aaa gag ggt cgt cgg gct gtt aaa gcg gga gct tat gct gct    1529
Ile Asp Lys Glu Gly Arg Arg Ala Val Lys Ala Gly Ala Tyr Ala Ala
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-2-

113

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tgc cag gaa gca aag gaa gat ata aag agt cat tca gaa aat gtc tct      1577
Cys Gln Glu Ala Lys Glu Asp Ile Lys Ser His Ser Glu Asn Val Ser
    280               285                   290

caa cat cca ctt cat gta gaa gta tta cac tca gag att atg gct cat      1625
Gln His Pro Leu His Val Glu Val Leu His Ser Glu Ile Met Ala His
295                   300                   305                   310

cag aaa ttt gct ttg cgt ctt ggt tcc tgg atg aac aaa att atg agc      1673
Gln Lys Phe Ala Leu Arg Leu Gly Ser Trp Met Asn Lys Ile Met Ser
                315                   320                   325

tat tca agt gac ttt agg cag atc ttt tgc caa gca tgc ctt aga gaa      1721
Tyr Ser Ser Asp Phe Arg Gln Ile Phe Cys Gln Ala Cys Leu Arg Glu
            330                   335                   340

gaa cct gac tcg gag aat ccc tgt ctc ata agc agg tta atg ctt tgg      1769
Glu Pro Asp Ser Glu Asn Pro Cys Leu Ile Ser Arg Leu Met Leu Trp
        345                   350                   355

gat gca aag ctt tat aaa ggt gcc cgt aag atc ctt cat gaa ttg atc      1817
Asp Ala Lys Leu Tyr Lys Gly Ala Arg Lys Ile Leu His Glu Leu Ile
    360                   365                   370

ttc agc agt ttt ttt atg gag atg gaa tac aaa aaa ctc ttt gct atg      1865
Phe Ser Ser Phe Phe Met Glu Met Glu Tyr Lys Lys Leu Phe Ala Met
375                   380                   385                   390

gaa ttt gtg aag tat tat aaa caa ctg cag aaa gaa tat atc agt gat      1913
Glu Phe Val Lys Tyr Tyr Lys Gln Leu Gln Lys Glu Tyr Ile Ser Asp
                395                   400                   405

gat cat gac aga agt atc tct ata act gca ctt tca gtt cag atg ttt      1961
Asp His Asp Arg Ser Ile Ser Ile Thr Ala Leu Ser Val Gln Met Phe
            410                   415                   420

act gtt cct act ctg gct cga cat ctt att gaa gag cag aat gtt atc      2009
Thr Val Pro Thr Leu Ala Arg His Leu Ile Glu Glu Gln Asn Val Ile
        425                   430                   435

tct gtc att act gaa act ctg cta gaa gtt tta cct gag tac ttg gac      2057
Ser Val Ile Thr Glu Thr Leu Leu Glu Val Leu Pro Glu Tyr Leu Asp
        440                   445                   450

agg aac aat aaa ttc aac ttc cag ggt tat agc cag gac aaa ttg gga      2105
Arg Asn Asn Lys Phe Asn Phe Gln Gly Tyr Ser Gln Asp Lys Leu Gly
455                   460                   465                   470

aga gta tat gca gta ata tgt gac cta aag tat atc ctg atc agc aaa      2153
Arg Val Tyr Ala Val Ile Cys Asp Leu Lys Tyr Ile Leu Ile Ser Lys
            475                   480                   485

ccc aca ata tgg aca gaa aga tta aga atg cag ttc ctt gaa ggt ttt      2201
Pro Thr Ile Trp Thr Glu Arg Leu Arg Met Gln Phe Leu Glu Gly Phe
            490                   495                   500

cga tct ttt ttg aag att ctt acc tgt atg cag gga atg gaa gaa atc      2249
Arg Ser Phe Leu Lys Ile Leu Thr Cys Met Gln Gly Met Glu Glu Ile
            505                   510                   515
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-3-

114

A

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cga aga cag gtt ggg caa cac att gaa gtg gat cct gat tgg gag gct       2297
Arg Arg Gln Val Gly Gln His Ile Glu Val Asp Pro Asp Trp Glu Ala
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gcc att gct ata cag atg caa ttg aag aat att tta ctc atg ttc caa       2345
Ala Ile Ala Ile Gln Met Gln Leu Lys Asn Ile Leu Leu Met Phe Gln
535             540             545                 550

gag tgg tgt gct tgt gat gaa gaa ctc tta ctt gtg gct tat aaa gaa       2393
Glu Trp Cys Ala Cys Asp Glu Glu Leu Leu Leu Val Ala Tyr Lys Glu
            555             560             565

tgt cac aaa gct gtg atg agg tgc agt acc agt ttc ata tct agt agc       2441
Cys His Lys Ala Val Met Arg Cys Ser Thr Ser Phe Ile Ser Ser Ser
        570             575             580

aag aca gta gta caa tcg tgt gga cat agt ttg gaa aca aag tcc tac       2489
Lys Thr Val Val Gln Ser Cys Gly His Ser Leu Glu Thr Lys Ser Tyr
        585             590             595

aga gta tct gag gat ctt gta agc ata cat ctg cca ctc tct agg acc       2537
Arg Val Ser Glu Asp Leu Val Ser Ile His Leu Pro Leu Ser Arg Thr
    600             605             610

ctt gct ggt ctt cat gta cgt tta agc agg ctg ggt gct gtt tca aga       2585
Leu Ala Gly Leu His Val Arg Leu Ser Arg Leu Gly Ala Val Ser Arg
615             620             625             630

ctg cat gaa ttt gtg tct ttt gag gac ttt caa gta gag gta cta gtg       2633
Leu His Glu Phe Val Ser Phe Glu Asp Phe Gln Val Glu Val Leu Val
            635             640             645

gaa tat cct tta cgt tgt ctg gtg ttg gtt gcc cag gtt gtt gct gag       2681
Glu Tyr Pro Leu Arg Cys Leu Val Leu Val Ala Gln Val Val Ala Glu
            650             655             660

atg tgg cga aga aat gga ctg tct ctt att agc cag gtg ttt tat tac       2729
Met Trp Arg Arg Asn Gly Leu Ser Leu Ile Ser Gln Val Phe Tyr Tyr
        665             670             675

caa gat gtt aag tgc aga gaa gaa atg tat gat aaa gat atc atc atg       2777
Gln Asp Val Lys Cys Arg Glu Glu Met Tyr Asp Lys Asp Ile Ile Met
    680             685             690

ctt cag att ggt gca tct tta atg gat ccc aat aag ttc ttg tta ctg       2825
Leu Gln Ile Gly Ala Ser Leu Met Asp Pro Asn Lys Phe Leu Leu Leu
695             700             705             710

gta ctt cag agg tat gaa ctt gcc gag gct ttt aac aag acc ata tct       2873
Val Leu Gln Arg Tyr Glu Leu Ala Glu Ala Phe Asn Lys Thr Ile Ser
            715             720             725

aca aaa gac cag gat ttg att aaa caa tat aat aca cta ata gaa gaa       2921
Thr Lys Asp Gln Asp Leu Ile Lys Gln Tyr Asn Thr Leu Ile Glu Glu
            730             735             740

atg ctt cag gtc ctc atc tat att gtg ggt gag cgt tat gta cct gga       2969
Met Leu Gln Val Leu Ile Tyr Ile Val Gly Glu Arg Tyr Val Pro Gly
        745             750             755
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-4-

115

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gtg gga aat gtg acc aaa gaa gag gtc aca atg aga gaa atc att cac      3017
Val Gly Asn Val Thr Lys Glu Glu Val Thr Met Arg Glu Ile Ile His
    760             765             770

ttg ctt tgc att gaa ccc atg cca cac agt gcc att gcc aaa aat tta      3065
Leu Leu Cys Ile Glu Pro Met Pro His Ser Ala Ile Ala Lys Asn Leu
775             780             785             790

cct gag aat gaa aat aat gaa act ggc tta gag aat gtc ata aac aaa      3113
Pro Glu Asn Glu Asn Asn Glu Thr Gly Leu Glu Asn Val Ile Asn Lys
            795             800             805

gtg gcc aca ttt aag aaa cca ggt gta tca ggc cat gga gtt tat gaa      3161
Val Ala Thr Phe Lys Lys Pro Gly Val Ser Gly His Gly Val Tyr Glu
            810             815             820

cta aaa gat gaa tca ctg aaa gac ttc aat atg tac ttt tat cat tac      3209
Leu Lys Asp Glu Ser Leu Lys Asp Phe Asn Met Tyr Phe Tyr His Tyr
        825             830             835

tcc aaa acc cag cat agc aag gct gaa cat atg cag aag aaa agg aga      3257
Ser Lys Thr Gln His Ser Lys Ala Glu His Met Gln Lys Lys Arg Arg
    840             845             850

aaa caa gaa aac aaa gat gaa gca ttg ccg cca cca cca cct cct gaa      3305
Lys Gln Glu Asn Lys Asp Glu Ala Leu Pro Pro Pro Pro Pro Glu
855             860             865             870

ttc tgc cct gct ttc agc aaa gtg att aac ctt ctc aac tgt gat atc      3353
Phe Cys Pro Ala Phe Ser Lys Val Ile Asn Leu Leu Asn Cys Asp Ile
            875             880             885

atg atg tac att ctc agg acc gta ttt gag cgg gca ata gac aca gat      3401
Met Met Tyr Ile Leu Arg Thr Val Phe Glu Arg Ala Ile Asp Thr Asp
            890             895             900

tct aac ttg tgg acc gaa ggg atg ctc caa atg gct ttt cat att ctg      3449
Ser Asn Leu Trp Thr Glu Gly Met Leu Gln Met Ala Phe His Ile Leu
        905             910             915

gca ttg ggt tta cta gaa gag aag caa cag ctt caa aaa gct cct gaa      3497
Ala Leu Gly Leu Leu Glu Glu Lys Gln Gln Leu Gln Lys Ala Pro Glu
    920             925             930

gaa gaa gta aca ttt gac ttt tat cat aag gct tca aga ttg gga agt      3545
Glu Glu Val Thr Phe Asp Phe Tyr His Lys Ala Ser Arg Leu Gly Ser
935             940             945             950

tca gcc atg aat ata caa atg ctt ttg gaa aaa ctc aaa gga att ccc      3593
Ser Ala Met Asn Ile Gln Met Leu Leu Glu Lys Leu Lys Gly Ile Pro
            955             960             965

cag tta gaa ggc cag aag gac atg ata acg tgg ata ctt cag atg ttt      3641
Gln Leu Glu Gly Gln Lys Asp Met Ile Thr Trp Ile Leu Gln Met Phe
        970             975             980

gac aca gtg aag cga tta aga gaa aaa tct tgt tta att gta gca acc      3689
Asp Thr Val Lys Arg Leu Arg Glu Lys Ser Cys Leu Ile Val Ala Thr
        985             990             995
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-5-

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aca tca  gga tcg gaa tct att  aag aat gat gag att  act cat gat       3734
Thr Ser  Gly Ser Glu Ser Ile  Lys Asn Asp Glu Ile  Thr His Asp
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aaa gaa  aaa gca gaa cga aaa  aga aaa gct gaa gct  gct agg cta       3779
Lys Glu  Lys Ala Glu Arg Lys  Arg Lys Ala Glu Ala  Ala Arg Leu
    1015              1020              1025

cat cgc  cag aag atc atg gct  cag atg tct gcc tta  cag aaa aac       3824
His Arg  Gln Lys Ile Met Ala  Gln Met Ser Ala Leu  Gln Lys Asn
    1030              1035              1040

ttc att  gaa act cat aaa ctc  atg tat gac aat aca  tca gaa atg       3869
Phe Ile  Glu Thr His Lys Leu  Met Tyr Asp Asn Thr  Ser Glu Met
    1045              1050              1055

cct ggg  aaa gaa gat tcc att  atg gag gaa gag agc  acc cca gca       3914
Pro Gly  Lys Glu Asp Ser Ile  Met Glu Glu Glu Ser  Thr Pro Ala
    1060              1065              1070

gtc agt  gac tac tct aga att  gct ttg ggt cct aaa  cgg ggt cca       3959
Val Ser  Asp Tyr Ser Arg Ile  Ala Leu Gly Pro Lys  Arg Gly Pro
    1075              1080              1085

tct gtt  act gaa aag gag gtg  ctg acg tgc atc ctt  tgc caa gaa       4004
Ser Val  Thr Glu Lys Glu Val  Leu Thr Cys Ile Leu  Cys Gln Glu
    1090              1095              1100

gaa cag  gag gtg aaa ata gaa  aat aat gcc atg gta  tta tcg gcc       4049
Glu Gln  Glu Val Lys Ile Glu  Asn Asn Ala Met Val  Leu Ser Ala
    1105              1110              1115

tgt gtc  cag aaa tct act gcc  tta acc cag cac agg  gga aaa ccc       4094
Cys Val  Gln Lys Ser Thr Ala  Leu Thr Gln His Arg  Gly Lys Pro
    1120              1125              1130

ata gaa  ctc tca gga gaa gcc  cta gac cca ctt ttc  atg gat cca       4139
Ile Glu  Leu Ser Gly Glu Ala  Leu Asp Pro Leu Phe  Met Asp Pro
    1135              1140              1145

gac ttg  gca tat gga act tat  aca gga agc tgt ggt  cat gta atg       4184
Asp Leu  Ala Tyr Gly Thr Tyr  Thr Gly Ser Cys Gly  His Val Met
    1150              1155              1160

cac gca  gtg tgc tgg cag aag  tat ttt gaa gct gta  cag ctg agc       4229
His Ala  Val Cys Trp Gln Lys  Tyr Phe Glu Ala Val  Gln Leu Ser
    1165              1170              1175

tct cag  cag cgc att cat gtt  gac ctt ttt gac ttg  gaa agt gga       4274
Ser Gln  Gln Arg Ile His Val  Asp Leu Phe Asp Leu  Glu Ser Gly
    1180              1185              1190

gaa tat  ctt tgc cct ctt tgc  aaa tct ctg tgc aat  act gtg atc       4319
Glu Tyr  Leu Cys Pro Leu Cys  Lys Ser Leu Cys Asn  Thr Val Ile
    1195              1200              1205

ccc att  att cct ttg caa cct  caa aag ata aac agt  gag aat gca       4364
Pro Ile  Ile Pro Leu Gln Pro  Gln Lys Ile Asn Ser  Glu Asn Ala
    1210              1215              1220
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-6-

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gat gct ctt gct caa ctt ttg  acc ctg gca cgg tgg  ata cag act        4409
Asp Ala Leu Ala Gln Leu Leu  Thr Leu Ala Arg Trp  Ile Gln Thr
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gtt ctg gcc aga ata tca ggt  tat aat ata aga cat  gct aaa gga        4454
Val Leu Ala Arg Ile Ser Gly  Tyr Asn Ile Arg His  Ala Lys Gly
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gaa aac cca att cct att ttc  ttt aat caa gga atg  gga gat tct        4499
Glu Asn Pro Ile Pro Ile Phe  Phe Asn Gln Gly Met  Gly Asp Ser
    1255            1260               1265

act ttg gag ttc cat tcc atc  ctg agt ttt ggc gtt  gag tct tcg        4544
Thr Leu Glu Phe His Ser Ile  Leu Ser Phe Gly Val  Glu Ser Ser
    1270            1275               1280

att aaa tat tca aat agc atc  aag gaa atg gtt att  ctc ttt gcc        4589
Ile Lys Tyr Ser Asn Ser Ile  Lys Glu Met Val Ile  Leu Phe Ala
    1285            1290               1295

aca aca att tat aga att gga  ttg aaa gtg cca cct  gat gaa agg        4634
Thr Thr Ile Tyr Arg Ile Gly  Leu Lys Val Pro Pro  Asp Glu Arg
    1300            1305               1310

gat cct cga gtc ccc atg ctg  acc tgg agc acc tgc  gct ttc act        4679
Asp Pro Arg Val Pro Met Leu  Thr Trp Ser Thr Cys  Ala Phe Thr
    1315            1320               1325

atc cag gca att gaa aat cta  ttg gga gat gaa gga  aaa cct ctg        4724
Ile Gln Ala Ile Glu Asn Leu  Leu Gly Asp Glu Gly  Lys Pro Leu
    1330            1335               1340

ttt gga gca ctt caa aat agg  cag cat aat ggt ctg  aaa gca tta        4769
Phe Gly Ala Leu Gln Asn Arg  Gln His Asn Gly Leu  Lys Ala Leu
    1345            1350               1355

atg cag ttt gca gtt gca cag  agg att acc tgt cct  cag gtc ctg        4814
Met Gln Phe Ala Val Ala Gln  Arg Ile Thr Cys Pro  Gln Val Leu
    1360            1365               1370

ata cag aaa cat ctg gtt cgt  ctt cta tca gtt gtt  ctt cct aac        4859
Ile Gln Lys His Leu Val Arg  Leu Leu Ser Val Val  Leu Pro Asn
    1375            1380               1385

ata aaa tca gaa gat aca cca  tgc ctt ctg tct ata  gat ctg ttt        4904
Ile Lys Ser Glu Asp Thr Pro  Cys Leu Leu Ser Ile  Asp Leu Phe
    1390            1395               1400

cat gtt ttg gtg ggt gct gtg  tta gca ttc cca tcc  ttg tat tgg        4949
His Val Leu Val Gly Ala Val  Leu Ala Phe Pro Ser  Leu Tyr Trp
    1405            1410               1415

gat gac cct gtt gat ctg cag  cct tct tca gtt agt  tct tcc tat        4994
Asp Asp Pro Val Asp Leu Gln  Pro Ser Ser Val Ser  Ser Ser Tyr
    1420            1425               1430

aac cac ctt tat ctc ttc cat  ttg atc acc atg gca  cac atg ctt        5039
Asn His Leu Tyr Leu Phe His  Leu Ile Thr Met Ala  His Met Leu
    1435            1440               1445
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118

A

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cag ata cta ctt aca gta gac   aca ggc cta ccc ctt   gct cag gtt      5084
Gln Ile Leu Leu Thr Val Asp   Thr Gly Leu Pro Leu   Ala Gln Val
    1450                1455                  1460

caa gaa gac agt gaa gag gct   cat tcc gca tct tct   ttc ttt gca      5129
Gln Glu Asp Ser Glu Glu Ala   His Ser Ala Ser Ser   Phe Phe Ala
    1465                1470                  1475

gaa att tct caa tat aca agt   ggc tcc att ggg tgt   gat att cct      5174
Glu Ile Ser Gln Tyr Thr Ser   Gly Ser Ile Gly Cys   Asp Ile Pro
    1480                1485                  1490

ggc tgg tat ttg tgg gtc tca   ctg aag aat ggc atc   acc cct tat      5219
Gly Trp Tyr Leu Trp Val Ser   Leu Lys Asn Gly Ile   Thr Pro Tyr
    1495                1500                  1505

ctt cgc tgt gct gca ttg ttt   ttc cac tat tta ctt   ggg gta act      5264
Leu Arg Cys Ala Ala Leu Phe   Phe His Tyr Leu Leu   Gly Val Thr
    1510                1515                  1520

ccg cct gag gaa ctg cat acc   aat tct gca gaa gga   gag tac agt      5309
Pro Pro Glu Glu Leu His Thr   Asn Ser Ala Glu Gly   Glu Tyr Ser
    1525                1530                  1535

gca ctc tgt agc tat cta tct   tta cct aca aat ttg   ttc ctg ctc      5354
Ala Leu Cys Ser Tyr Leu Ser   Leu Pro Thr Asn Leu   Phe Leu Leu
    1540                1545                  1550

ttc cag gaa tat tgg gat act   gta agg cac ttg ctc   cag agg tgg      5399
Phe Gln Glu Tyr Trp Asp Thr   Val Arg Pro Leu Leu   Gln Arg Trp
    1555                1560                  1565

tgt gca gat cct gcc tta cta   aac tgt ttg aag caa   aaa aac acc      5444
Cys Ala Asp Pro Ala Leu Leu   Asn Cys Leu Lys Gln   Lys Asn Thr
    1570                1575                  1580

gtg gtc agg tac cct aga aaa   aga aat agt ttg ata   gag ctt cct      5489
Val Val Arg Tyr Pro Arg Lys   Arg Asn Ser Leu Ile   Glu Leu Pro
    1585                1590                  1595

gat gac tat agc tgc ctc ctg   aat caa gct tct cat   ttc agg tgc      5534
Asp Asp Tyr Ser Cys Leu Leu   Asn Gln Ala Ser His   Phe Arg Cys
    1600                1605                  1610

cca cgg tct gca gat gat gag   cga aag cat cct gtc   ctc tgc ctt      5579
Pro Arg Ser Ala Asp Asp Glu   Arg Lys His Pro Val   Leu Cys Leu
    1615                1620                  1625

ttc tgt ggg gct ata cta tgt   tct cag aac att tgc   tgc cag gaa      5624
Phe Cys Gly Ala Ile Leu Cys   Ser Gln Asn Ile Cys   Cys Gln Glu
    1630                1635                  1640

att gtg aac ggg gaa gag gtt   gga gct tgc att ttt   cac gca ctt      5669
Ile Val Asn Gly Glu Glu Val   Gly Ala Cys Ile Phe   His Ala Leu
    1645                1650                  1655

cac tgt gga gcc gga gtc tgc   att ttc cta aaa atc   aga gaa tgc      5714
His Cys Gly Ala Gly Val Cys   Ile Phe Leu Lys Ile   Arg Glu Cys
    1660                1665                  1670
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-8-

119

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cga gtg gtc ctg gtt gaa ggt  aaa gcc aga ggc tgt  gcc tat cca      5759
Arg Val Val Leu Val Glu Gly  Lys Ala Arg Gly Cys  Ala Tyr Pro
    1675             1680              1685

gct cct tac ttg gat gaa tat  gga gaa aca gac cct  ggc ctg aag      5804
Ala Pro Tyr Leu Asp Glu Tyr  Gly Glu Thr Asp Pro  Gly Leu Lys
    1690             1695              1700

agg ggc aac ccc ctt cat tta  tct cgt gag cgg tat  cgg aag ctc      5849
Arg Gly Asn Pro Leu His Leu  Ser Arg Glu Arg Tyr  Arg Lys Leu
    1705             1710              1715

cat ttg gtc tgg caa caa cac  tgc att ata gaa gag  att gct agg      5894
His Leu Val Trp Gln Gln His  Cys Ile Ile Glu Glu  Ile Ala Arg
    1720             1725              1730

agc caa gag act aat cag atg  tta ttt gga ttc aac  tgg cag tta      5939
Ser Gln Glu Thr Asn Gln Met  Leu Phe Gly Phe Asn  Trp Gln Leu
    1735             1740              1745

ctg tgagctccaa ctctgcctca agacaatcac aaatgacgac agtagtaaag          5992
Leu


gctgattcaa aattatggaa aactttctga gggctgggaa agtattggag ggtcttttgc   6052

tccatgtcca ggttcactta catcaataaa atatttctta atggagtatt gctttcaatt   6112

agcaaacata tgcttcacag gaaaaaagga catagatcaa tctgttttat gtgctagtat   6172

ttccaggaat ttattcccct tcataatttg tctcatttca ttttatttca tccacttggt   6232

agatgaagtc acgtcaaaca gttgtagaca ttttatgtgt tggttaactc ttctgcaatt   6292

ttgtatttgg tgtttt                                                  6308
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<213> Homo sapiens

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1               5                  10                  15

Glu Leu Pro Gln Thr Pro Gln Arg Leu Ala Ser Trp Trp Asp Gln Gln
            20                  25                  30

Val Asp Phe Tyr Thr Ala Phe Leu His His Leu Ala Gln Leu Val Pro
            35                  40                  45

Glu Ile Tyr Phe Ala Glu Met Asp Pro Asp Leu Glu Lys Gln Glu Glu
        50                  55                  60

Ser Val Gln Met Ser Ile Phe Thr Pro Leu Glu Trp Tyr Leu Phe Gly
65                  70                  75                  80

Glu Asp Pro Asp Ile Cys Leu Glu Lys Leu Lys His Ser Gly Ala Phe
                85                  90                  95

Gln Leu Cys Gly Arg Val Phe Lys Ser Gly Glu Thr Thr Tyr Ser Cys
            100                 105                 110
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-9-

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Arg Asp Cys Ala Ile Asp Pro Thr Cys Val Leu Cys Met Asp Cys Phe
    115                 120                 125

Gln Asp Ser Val His Lys Asn His Arg Tyr Lys Met His Thr Ser Thr
    130                 135                 140

Gly Gly Gly Phe Cys Asp Cys Gly Asp Thr Glu Ala Trp Lys Thr Gly
145                 150                 155                 160

Pro Phe Cys Val Asn His Glu Pro Gly Arg Ala Gly Thr Ile Lys Glu
                165                 170                 175

Asn Ser Arg Cys Pro Leu Asn Glu Glu Val Ile Val Gln Ala Arg Lys
            180                 185                 190

Ile Phe Pro Ser Val Ile Lys Tyr Val Val Glu Met Thr Ile Trp Glu
            195                 200                 205

Glu Glu Lys Glu Leu Pro Pro Glu Leu Gln Ile Arg Glu Lys Asn Glu
    210                 215                 220

Arg Tyr Tyr Cys Val Leu Phe Asn Asp Glu His His Ser Tyr Asp His
225                 230                 235                 240

Val Ile Tyr Ser Leu Gln Arg Ala Leu Asp Cys Glu Leu Ala Glu Ala
            245                 250                 255

Gln Leu His Thr Thr Ala Ile Asp Lys Glu Gly Arg Arg Ala Val Lys
            260                 265                 270

Ala Gly Ala Tyr Ala Ala Cys Gln Glu Ala Lys Glu Asp Ile Lys Ser
            275                 280                 285

His Ser Glu Asn Val Ser Gln His Pro Leu His Val Glu Val Leu His
    290                 295                 300

Ser Glu Ile Met Ala His Gln Lys Phe Ala Leu Arg Leu Gly Ser Trp
305                 310                 315                 320

Met Asn Lys Ile Met Ser Tyr Ser Ser Asp Phe Arg Gln Ile Phe Cys
            325                 330                 335

Gln Ala Cys Leu Arg Glu Glu Pro Asp Ser Glu Asn Pro Cys Leu Ile
            340                 345                 350

Ser Arg Leu Met Leu Trp Asp Ala Lys Leu Tyr Lys Gly Ala Arg Lys
            355                 360                 365


Ile Leu His Glu Leu Ile Phe Ser Ser Phe Phe Met Glu Met Glu Tyr
    370                 375                 380

Lys Lys Leu Phe Ala Met Glu Phe Val Lys Tyr Tyr Lys Gln Leu Gln
385                 390                 395                 400

Lys Glu Tyr Ile Ser Asp Asp His Asp Arg Ser Ile Ser Ile Thr Ala
                405                 410                 415

Leu Ser Val Gln Met Phe Thr Val Pro Thr Leu Ala Arg His Leu Ile
            420                 425                 430

Glu Glu Gln Asn Val Ile Ser Val Ile Thr Glu Thr Leu Leu Glu Val
            435                 440                 445
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-10-

121   A

```
Leu Pro Glu Tyr Leu Asp Arg Asn Asn Lys Phe Asn Phe Gln Gly Tyr
    450                 455             460

Ser Gln Asp Lys Leu Gly Arg Val Tyr Ala Val Ile Cys Asp Leu Lys
465                 470             475                 480

Tyr Ile Leu Ile Ser Lys Pro Thr Ile Trp Thr Glu Arg Leu Arg Met
                485             490                 495

Gln Phe Leu Glu Gly Phe Arg Ser Phe Leu Lys Ile Leu Thr Cys Met
            500             505             510

Gln Gly Met Glu Glu Ile Arg Arg Gln Val Gly Gln His Ile Glu Val
        515             520             525

Asp Pro Asp Trp Glu Ala Ala Ile Ala Ile Gln Met Gln Leu Lys Asn
    530             535             540

Ile Leu Leu Met Phe Gln Glu Trp Cys Ala Cys Asp Glu Glu Leu Leu
545             550             555                 560

Leu Val Ala Tyr Lys Glu Cys His Lys Ala Val Met Arg Cys Ser Thr
            565             570             575

Ser Phe Ile Ser Ser Ser Lys Thr Val Val Gln Ser Cys Gly His Ser
            580             585             590

Leu Glu Thr Lys Ser Tyr Arg Val Ser Glu Asp Leu Val Ser Ile His
        595             600             605

Leu Pro Leu Ser Arg Thr Leu Ala Gly Leu His Val Arg Leu Ser Arg
    610             615             620

Leu Gly Ala Val Ser Arg Leu His Glu Phe Val Ser Phe Glu Asp Phe
625             630             635                 640

Gln Val Glu Val Leu Val Glu Tyr Pro Leu Arg Cys Leu Val Leu Val
            645             650             655

Ala Gln Val Val Ala Glu Met Trp Arg Arg Asn Gly Leu Ser Leu Ile
        660             665             670

Ser Gln Val Phe Tyr Tyr Gln Asp Val Lys Cys Arg Glu Glu Met Tyr
    675             680             685

Asp Lys Asp Ile Ile Met Leu Gln Ile Gly Ala Ser Leu Met Asp Pro
    690             695             700

Asn Lys Phe Leu Leu Leu Val Leu Gln Arg Tyr Glu Leu Ala Glu Ala
705             710             715                 720

Phe Asn Lys Thr Ile Ser Thr Lys Asp Gln Asp Leu Ile Lys Gln Tyr
                725             730             735

Asn Thr Leu Ile Glu Glu Met Leu Gln Val Leu Ile Tyr Ile Val Gly
        740             745             750

Glu Arg Tyr Val Pro Gly Val Gly Asn Val Thr Lys Glu Glu Val Thr
        755             760             765
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Met Arg Glu Ile Ile His Leu Leu Cys Ile Glu Pro Met Pro His Ser
    770                 775                 780

Ala Ile Ala Lys Asn Leu Pro Glu Asn Glu Asn Asn Glu Thr Gly Leu
785                 790                 795                 800

Glu Asn Val Ile Asn Lys Val Ala Thr Phe Lys Lys Pro Gly Val Ser
                805                 810                 815

Gly His Gly Val Tyr Glu Leu Lys Asp Glu Ser Leu Lys Asp Phe Asn
                820                 825                 830

Met Tyr Phe Tyr His Tyr Ser Lys Thr Gln His Ser Lys Ala Glu His
        835                 840                 845

Met Gln Lys Lys Arg Arg Lys Gln Glu Asn Lys Asp Glu Ala Leu Pro
    850                 855                 860

Pro Pro Pro Pro Pro Glu Phe Cys Pro Ala Phe Ser Lys Val Ile Asn
865                 870                 875                 880

Leu Leu Asn Cys Asp Ile Met Met Tyr Ile Leu Arg Thr Val Phe Glu
                885                 890                 895

Arg Ala Ile Asp Thr Asp Ser Asn Leu Trp Thr Glu Gly Met Leu Gln
        900                 905                 910

Met Ala Phe His Ile Leu Ala Leu Gly Leu Leu Glu Glu Lys Gln Gln
        915                 920                 925

Leu Gln Lys Ala Pro Glu Glu Glu Val Thr Phe Asp Phe Tyr His Lys
    930                 935                 940

Ala Ser Arg Leu Gly Ser Ser Ala Met Asn Ile Gln Met Leu Leu Glu
945                 950                 955                 960

Lys Leu Lys Gly Ile Pro Gln Leu Glu Gly Gln Lys Asp Met Ile Thr
                965                 970                 975

Trp Ile Leu Gln Met Phe Asp Thr Val Lys Arg Leu Arg Glu Lys Ser
        980                 985                 990

Cys Leu Ile Val Ala Thr Thr Ser  Gly Ser Glu Ser Ile  Lys Asn Asp
    995                 1000                1005

Glu Ile  Thr His Asp Lys Glu  Lys Ala Glu Arg Lys  Arg Lys Ala
    1010                1015                1020

Glu Ala  Ala Arg Leu His Arg  Gln Lys Ile Met Ala  Gln Met Ser
    1025                1030                1035

Ala Leu  Gln Lys Asn Phe Ile  Glu Thr His Lys Leu  Met Tyr Asp
    1040                1045                1050

Asn Thr  Ser Glu Met Pro Gly  Lys Glu Asp Ser Ile  Met Glu Glu
    1055                1060                1065

Glu Ser  Thr Pro Ala Val Ser  Asp Tyr Ser Arg Ile  Ala Leu Gly
    1070                1075                1080

Pro Lys  Arg Gly Pro Ser Val  Thr Glu Lys Glu Val  Leu Thr Cys
    1085                1090                1095
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-12-

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Ile Leu  Cys Gln Glu Glu Gln  Glu Val Lys Ile Glu  Asn Asn Ala
    1100                1105            1110

Met Val  Leu Ser Ala Cys Val  Gln Lys Ser Thr Ala  Leu Thr Gln
    1115                1120            1125

His Arg  Gly Lys Pro Ile Glu  Leu Ser Gly Glu Ala  Leu Asp Pro
    1130                1135            1140

Leu Phe  Met Asp Pro Asp Leu  Ala Tyr Gly Thr Tyr  Thr Gly Ser
    1145                1150            1155

Cys Gly  His Val Met His Ala  Val Cys Trp Gln Lys  Tyr Phe Glu
    1160                1165            1170

Ala Val  Gln Leu Ser Ser Gln  Gln Arg Ile His Val  Asp Leu Phe
    1175                1180            1185

Asp Leu  Glu Ser Gly Glu Tyr  Leu Cys Pro Leu Cys  Lys Ser Leu
    1190                1195            1200

Cys Asn  Thr Val Ile Pro Ile  Ile Pro Leu Gln Pro  Gln Lys Ile
    1205                1210            1215

Asn Ser  Glu Asn Ala Asp Ala  Leu Ala Gln Leu Leu  Thr Leu Ala
    1220                1225            1230

Arg Trp  Ile Gln Thr Val Leu  Ala Arg Ile Ser Gly  Tyr Asn Ile
    1235                1240            1245

Arg His  Ala Lys Gly Glu Asn  Pro Ile Pro Ile Phe  Phe Asn Gln
    1250                1255            1260

Gly Met  Gly Asp Ser Thr Leu  Glu Phe His Ser Ile  Leu Ser Phe
    1265                1270            1275

Gly Val  Glu Ser Ser Ile Lys  Tyr Ser Asn Ser Ile  Lys Glu Met
    1280                1285            1290

Val Ile  Leu Phe Ala Thr Thr  Ile Tyr Arg Ile Gly  Leu Lys Val
    1295                1300            1305

Pro Pro  Asp Glu Arg Asp Pro  Arg Val Pro Met Leu  Thr Trp Ser
    1310                1315            1320

Thr Cys  Ala Phe Thr Ile Gln  Ala Ile Glu Asn Leu  Leu Gly Asp
    1325                1330            1335

Glu Gly  Lys Pro Leu Phe Gly  Ala Leu Gln Asn Arg  Gln His Asn
    1340                1345            1350

Gly Leu  Lys Ala Leu Met Gln  Phe Ala Val Ala Gln  Arg Ile Thr
    1355                1360            1365

Cys Pro  Gln Val Leu Ile Gln  Lys His Leu Val Arg  Leu Leu Ser
    1370                1375            1380

Val Val  Leu Pro Asn Ile Lys  Ser Glu Asp Thr Pro  Cys Leu Leu
    1385                1390            1395

Ser Ile  Asp Leu Phe His Val  Leu Val Gly Ala Val  Leu Ala Phe
    1400                1405            1410
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-13-

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Pro Ser  Leu Tyr Trp Asp Asp  Pro Val Asp Leu Gln  Pro Ser Ser
    1415                 1420                 1425

Val Ser  Ser Ser Tyr Asn His  Leu Tyr Leu Phe His  Leu Ile Thr
    1430                 1435                 1440

Met Ala  His Met Leu Gln Ile  Leu Leu Thr Val Asp  Thr Gly Leu
    1445                 1450                 1455

Pro Leu  Ala Gln Val Gln Glu  Asp Ser Glu Glu Ala  His Ser Ala
    1460                 1465                 1470



Ser Ser  Phe Phe Ala Glu Ile  Ser Gln Tyr Thr Ser  Gly Ser Ile
    1475                 1480                 1485

Gly Cys  Asp Ile Pro Gly Trp  Tyr Leu Trp Val Ser  Leu Lys Asn
    1490                 1495                 1500

Gly Ile  Thr Pro Tyr Leu Arg  Cys Ala Ala Leu Phe  Phe His Tyr
    1505                 1510                 1515

Leu Leu  Gly Val Thr Pro Pro  Glu Glu Leu His Thr  Asn Ser Ala
    1520                 1525                 1530

Glu Gly  Glu Tyr Ser Ala Leu  Cys Ser Tyr Leu Ser  Leu Pro Thr
    1535                 1540                 1545

Asn Leu  Phe Leu Leu Phe Gln  Glu Tyr Trp Asp Thr  Val Arg Pro
    1550                 1555                 1560

Leu Leu  Gln Arg Trp Cys Ala  Asp Pro Ala Leu Leu  Asn Cys Leu
    1565                 1570                 1575

Lys Gln  Lys Asn Thr Val Val  Arg Tyr Pro Arg Lys  Arg Asn Ser
    1580                 1585                 1590

Leu Ile  Glu Leu Pro Asp Asp  Tyr Ser Cys Leu Leu  Asn Gln Ala
    1595                 1600                 1605

Ser His  Phe Arg Cys Pro Arg  Ser Ala Asp Asp Glu  Arg Lys His
    1610                 1615                 1620

Pro Val  Leu Cys Leu Phe Cys  Gly Ala Ile Leu Cys  Ser Gln Asn
    1625                 1630                 1635

Ile Cys  Cys Gln Glu Ile Val  Asn Gly Glu Glu Val  Gly Ala Cys
    1640                 1645                 1650

Ile Phe  His Ala Leu His Cys  Gly Ala Gly Val Cys  Ile Phe Leu
    1655                 1660                 1665

Lys Ile  Arg Glu Cys Arg Val  Val Leu Val Glu Gly  Lys Ala Arg
    1670                 1675                 1680



Gly Cys  Ala Tyr Pro Ala Pro  Tyr Leu Asp Glu Tyr  Gly Glu Thr
    1685                 1690                 1695

Asp Pro  Gly Leu Lys Arg Gly  Asn Pro Leu His Leu  Ser Arg Glu
    1700                 1705                 1710
```

125

Arg Tyr Arg Lys Leu His Leu Val Trp Gln Gln His Cys Ile Ile
    1715   1720   1725

Glu Glu Ile Ala Arg Ser Gln Glu Thr Asn Gln Met Leu Phe Gly
    1730   1735   1740

Phe Asn Trp Gln Leu Leu
    1745

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<212>   DNA
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<222>   (295)..(5559)

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gacgagccag tgacttgact cttgggcgct aagcttggga gggagcgcag gaggccgctg   120

tccttccttt ccggttcacg tcacccttct ctccctctgt tgctccacct gcagccactt   180

ggacggctcc gggactgatt gcctggggca ggggtggcag tcgaggccgc cggggccgag   240

gtgaggctgc agctctccgg gcggcggtag cgctggggag gaggaggaga gaag atg   297
                                                              Met
                                                              1

gcg tcg gag cta gag cca gag gtg cag gcc atc gac cgg agt ttg ctg   345
Ala Ser Glu Leu Glu Pro Glu Val Gln Ala Ile Asp Arg Ser Leu Leu
            5   10   15

gaa tgt tcg gcc gag gag att gcg ggg aaa tgg ctg caa gca act gac   393
Glu Cys Ser Ala Glu Glu Ile Ala Gly Lys Trp Leu Gln Ala Thr Asp
        20   25   30

ctc act aga gaa gtg tac cag cat tta gcc cac tat gta ccc aaa atc   441
Leu Thr Arg Glu Val Tyr Gln His Leu Ala His Tyr Val Pro Lys Ile
    35   40   45

tac tgc agg ggt ccc aac cct ttt cca cag aaa gaa gac atg ctg gca   489
Tyr Cys Arg Gly Pro Asn Pro Phe Pro Gln Lys Glu Asp Met Leu Ala
50   55   60   65

cag cat gtt ttg ttg gga cca atg gaa tgg tac ctt tgt ggt gaa gat   537
Gln His Val Leu Leu Gly Pro Met Glu Trp Tyr Leu Cys Gly Glu Asp
                70   75   80

cct gca ttt gga ttt cca aaa ctt gag caa gca aac aaa cct tct cat   585
Pro Ala Phe Gly Phe Pro Lys Leu Glu Gln Ala Asn Lys Pro Ser His
                85   90   95

ctt tgt ggt cgt gtt ttt aaa gta gga gag cct aca tat tct tgc aga   633
Leu Cys Gly Arg Val Phe Lys Val Gly Glu Pro Thr Tyr Ser Cys Arg
            100   105   110

gac tgt gca gtt gat cca act tgt gtt ttg tgc atg gag tgc ttt ttg   681
Asp Cys Ala Val Asp Pro Thr Cys Val Leu Cys Met Glu Cys Phe Leu
    115   120   125

-15-

126

A

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gga agt att cac aga gat cat cga tat agg atg aca aca tca gga ggt        729
Gly Ser Ile His Arg Asp His Arg Tyr Arg Met Thr Thr Ser Gly Gly
130             135             140             145

gga ggt ttc tgt gac tgt ggt gat act gaa gcc tgg aaa gag ggt cct        777
Gly Gly Phe Cys Asp Cys Gly Asp Thr Glu Ala Trp Lys Glu Gly Pro
                150             155             160

tac tgt caa aaa cat gaa ctt aac acc tct gaa att gag gaa gaa gag        825
Tyr Cys Gln Lys His Glu Leu Asn Thr Ser Glu Ile Glu Glu Glu Glu
            165             170             175

gat cct ctt gtt cat tta tca gaa gat gtg ata gca aga act tat aac        873
Asp Pro Leu Val His Leu Ser Glu Asp Val Ile Ala Arg Thr Tyr Asn
        180             185             190

att ttt gct att acg ttt cgg tat gca gta gaa ata tta acc tgg gaa        921
Ile Phe Ala Ile Thr Phe Arg Tyr Ala Val Glu Ile Leu Thr Trp Glu
    195             200             205

aaa gaa agt gaa ttg cca gca gat tta gag atg gta gag aag agt gac        969
Lys Glu Ser Glu Leu Pro Ala Asp Leu Glu Met Val Glu Lys Ser Asp
210             215             220             225

acc tac tat tgc atg ctg ttt aat gat gag gtt cac acc tat gaa caa       1017
Thr Tyr Tyr Cys Met Leu Phe Asn Asp Glu Val His Thr Tyr Glu Gln
                230             235             240

gtt att tat act ctt cag aaa gct gtt aac tgt aca caa aaa gaa gct       1065
Val Ile Tyr Thr Leu Gln Lys Ala Val Asn Cys Thr Gln Lys Glu Ala
            245             250             255

att ggt ttt gca act aca gta gat cga gat ggg cgt agg tct gtt cga       1113
Ile Gly Phe Ala Thr Thr Val Asp Arg Asp Gly Arg Arg Ser Val Arg
        260             265             270

tat gga gat ttt cag tat tgt gag caa gca aaa tca gta att gtg aga       1161
Tyr Gly Asp Phe Gln Tyr Cys Glu Gln Ala Lys Ser Val Ile Val Arg
        275             280             285

aat acc agt aga cag aca aag cca ctc aaa gtt caa gtt atg cat tcg       1209
Asn Thr Ser Arg Gln Thr Lys Pro Leu Lys Val Gln Val Met His Ser
290             295             300             305

tct att gtc gca cat cag aat ttt ggt ttg aaa ctt ttg tct tgg ctg       1257
Ser Ile Val Ala His Gln Asn Phe Gly Leu Lys Leu Leu Ser Trp Leu
            310             315             320

gga agt att att gga tat tca gat ggc ctt cgc cgg att tta tgt caa       1305
Gly Ser Ile Ile Gly Tyr Ser Asp Gly Leu Arg Arg Ile Leu Cys Gln
            325             330             335

gtt ggt tta caa gaa ggg cca gat ggt gaa aac tct tct cta gtg gac       1353
Val Gly Leu Gln Glu Gly Pro Asp Gly Glu Asn Ser Ser Leu Val Asp
        340             345             350

aga ctg atg ctt agt gat tcc aaa tta tgg aaa ggt gct agg agt gta       1401
Arg Leu Met Leu Ser Asp Ser Lys Leu Trp Lys Gly Ala Arg Ser Val
        355             360             365
```

-16-

127

```
tat cat cag ttg ttc atg agc agt ctg ctt atg gat ttg aaa tac aag      1449
Tyr His Gln Leu Phe Met Ser Ser Leu Leu Met Asp Leu Lys Tyr Lys
370                 375                 380                 385

aaa cta ttt gct gtt cga ttt gca aaa aat tac cag cag ttg cag aga      1497
Lys Leu Phe Ala Val Arg Phe Ala Lys Asn Tyr Gln Gln Leu Gln Arg
                    390                 395                 400

gat ttt atg gag gat gat cac gag cga gca gtg tcg gtg act gct cta      1545
Asp Phe Met Glu Asp Asp His Glu Arg Ala Val Ser Val Thr Ala Leu
                405                 410                 415

tct gtc cag ttc ttc acc gca cct act ctg gct cga atg ctc atc aca      1593
Ser Val Gln Phe Phe Thr Ala Pro Thr Leu Ala Arg Met Leu Ile Thr
                420                 425                 430

gaa gaa aac ttg atg agc att atc att aag act ttt atg gat cat ttg      1641
Glu Glu Asn Leu Met Ser Ile Ile Ile Lys Thr Phe Met Asp His Leu
    435                 440                 445

aga cat cga gat gcc cag ggc aga ttt cag ttt gaa cga tac act gct      1689
Arg His Arg Asp Ala Gln Gly Arg Phe Gln Phe Glu Arg Tyr Thr Ala
450                 455                 460                 465

tta caa gcc ttc aaa ttt agg aga gta cag agc ctt att tta gat ctc      1737
Leu Gln Ala Phe Lys Phe Arg Arg Val Gln Ser Leu Ile Leu Asp Leu
                470                 475                 480

aag tat gtg tta att agc aaa cca act gaa tgg tca gat gag ctg agg      1785
Lys Tyr Val Leu Ile Ser Lys Pro Thr Glu Trp Ser Asp Glu Leu Arg
                485                 490                 495

cag aag ttc cta gaa ggg ttt gat gcc ttt ttg gaa tta cta aaa tgt      1833
Gln Lys Phe Leu Glu Gly Phe Asp Ala Phe Leu Glu Leu Leu Lys Cys
                500                 505                 510

atg cag gga atg gat cca att aca cgt caa gta gga caa cat att gaa      1881
Met Gln Gly Met Asp Pro Ile Thr Arg Gln Val Gly Gln His Ile Glu
                515                 520                 525

atg gaa cca gag tgg gaa gca gcc ttc aca cta caa atg aaa tta aca      1929
Met Glu Pro Glu Trp Glu Ala Ala Phe Thr Leu Gln Met Lys Leu Thr
530                 535                 540                 545

cat gtc att tca atg atg cag gac tgg tgt gct tca gat gaa aaa gtg      1977
His Val Ile Ser Met Met Gln Asp Trp Cys Ala Ser Asp Glu Lys Val
                550                 555                 560

tta atc gaa gct tac aag aaa tgt ctc gct gta ctg atg cag tgt cat      2025
Leu Ile Glu Ala Tyr Lys Lys Cys Leu Ala Val Leu Met Gln Cys His
                565                 570                 575

ggt ggt tat act gat ggt gaa cag cca atc aca cta agc att tgt gga      2073
Gly Gly Tyr Thr Asp Gly Glu Gln Pro Ile Thr Leu Ser Ile Cys Gly
                580                 585                 590

cat tca gtg gaa act atc aga tac tgt gtt tcc caa gaa aaa gtt agc      2121
His Ser Val Glu Thr Ile Arg Tyr Cys Val Ser Gln Glu Lys Val Ser
                595                 600                 605

att cac ctc cca gtt tct cgc tta ctt gca ggt tta cat gta tta tta      2169
Ile His Leu Pro Val Ser Arg Leu Leu Ala Gly Leu His Val Leu Leu
610                 615                 620                 625
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-17-

128

```
agc aaa agt gaa gtg gca tat aaa ttt cca gag ctc cta cct cta agt      2217
Ser Lys Ser Glu Val Ala Tyr Lys Phe Pro Glu Leu Leu Pro Leu Ser
            630                 635                 640

gaa ctt agc cca ccc atg ttg ata gaa cac cct ctt aga tgt ctt gtt      2265
Glu Leu Ser Pro Pro Met Leu Ile Glu His Pro Leu Arg Cys Leu Val
            645                 650                 655

ctg tgt gcc caa gta cat gcc gga atg tgg aga aga aat ggg ttc tct      2313
Leu Cys Ala Gln Val His Ala Gly Met Trp Arg Arg Asn Gly Phe Ser
            660                 665                 670

cta gta aac cag att tat tac tac cat aat gtg aaa tgc aga cgt gag      2361
Leu Val Asn Gln Ile Tyr Tyr Tyr His Asn Val Lys Cys Arg Arg Glu
            675                 680                 685

atg ttt gac aag gat gta gta atg ctt cag aca ggt gtc tcc atg atg      2409
Met Phe Asp Lys Asp Val Val Met Leu Gln Thr Gly Val Ser Met Met
690                 695                 700                 705

gat cca aat cat ttc ctg atg atc atg ctc agc cgc ttt gaa ctt tat      2457
Asp Pro Asn His Phe Leu Met Ile Met Leu Ser Arg Phe Glu Leu Tyr
            710                 715                 720

cag att ttc agt act cca gac tat gga aaa aga ttt agt tct gag att      2505
Gln Ile Phe Ser Thr Pro Asp Tyr Gly Lys Arg Phe Ser Ser Glu Ile
            725                 730                 735

acc cat aag gat gtt gtt cag cag aac aat act cta ata gaa gaa atg      2553
Thr His Lys Asp Val Val Gln Gln Asn Asn Thr Leu Ile Glu Glu Met
            740                 745                 750

cta tac ctc att ata atg ctt gtt gga gag aga ttt agt cct gga gtt      2601
Leu Tyr Leu Ile Ile Met Leu Val Gly Glu Arg Phe Ser Pro Gly Val
            755                 760                 765

gga cag gta aat gct aca gat gaa atc aag cga gag att atc cat cag      2649
Gly Gln Val Asn Ala Thr Asp Glu Ile Lys Arg Glu Ile Ile His Gln
770                 775                 780                 785

ttg agt atc aag cct atg gct cat agt gaa ttg gta aag tct tta cct      2697
Leu Ser Ile Lys Pro Met Ala His Ser Glu Leu Val Lys Ser Leu Pro
            790                 795                 800

gaa gat gag aac aag gag act ggc atg gag agt gta atc gaa gca gtt      2745
Glu Asp Glu Asn Lys Glu Thr Gly Met Glu Ser Val Ile Glu Ala Val
            805                 810                 815

gcc cat ttc aag aaa cct gga tta aca gga cga ggc atg tat gaa ctg      2793
Ala His Phe Lys Lys Pro Gly Leu Thr Gly Arg Gly Met Tyr Glu Leu
            820                 825                 830

aaa cca gaa tgt gcc aaa gag ttc aac ttg tat ttc tat cac ttt tca      2841
Lys Pro Glu Cys Ala Lys Glu Phe Asn Leu Tyr Phe Tyr His Phe Ser
            835                 840                 845

agg gca gaa cag tcc aag gca gaa gaa gcg caa cgg aaa ttg aaa aga      2889
Arg Ala Glu Gln Ser Lys Ala Glu Glu Ala Gln Arg Lys Leu Lys Arg
850                 855                 860                 865
```

129

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caa aat aga gaa gat aca gca ctc cca cct ccg gtg ttg cct cca ttc        2937
Gln Asn Arg Glu Asp Thr Ala Leu Pro Pro Pro Val Leu Pro Pro Phe
                    870             875                 880

tgc cct ctg ttt gca agc ctg gtt aac att ttg cag tca gat gtc atg        2985
Cys Pro Leu Phe Ala Ser Leu Val Asn Ile Leu Gln Ser Asp Val Met
                885                 890                 895

ttg tgc atc atg gga aca att ctg caa tgg gct gtg gaa cat aat gga        3033
Leu Cys Ile Met Gly Thr Ile Leu Gln Trp Ala Val Glu His Asn Gly
                900                 905                 910

tat gcc tgg tca gag tcc atg ctg caa agg gtg tta cat tta att ggc        3081
Tyr Ala Trp Ser Glu Ser Met Leu Gln Arg Val Leu His Leu Ile Gly
        915                 920                 925

atg gca cta caa gaa gaa aaa caa cat tta gag aat gtc acg gaa gag        3129
Met Ala Leu Gln Glu Glu Lys Gln His Leu Glu Asn Val Thr Glu Glu
930                 935                 940                 945

cat gta gta aca ttt acc ttc act cag aag ata tca aaa cct ggt gaa        3177
His Val Val Thr Phe Thr Phe Thr Gln Lys Ile Ser Lys Pro Gly Glu
                    950                 955                 960

gcg cca aaa aat tct cct agc ata cta gct atg ctg gaa aca cta caa        3225
Ala Pro Lys Asn Ser Pro Ser Ile Leu Ala Met Leu Glu Thr Leu Gln
            965                 970                 975


aat gct ccc tac cta gaa gtc cac aaa gac atg att cgg tgg ata ttg        3273
Asn Ala Pro Tyr Leu Glu Val His Lys Asp Met Ile Arg Trp Ile Leu
            980                 985                 990

aag act ttt aat gct gtt aaa  aag atg agg gag agt  tca cct acc agt      3321
Lys Thr Phe Asn Ala Val Lys  Lys Met Arg Glu Ser  Ser Pro Thr Ser
        995                 1000                1005

ccc  gtg gca gag aca gaa  gga acc ata atg gaa  gag agt tca agg         3366
Pro  Val Ala Glu Thr Glu  Gly Thr Ile Met Glu  Glu Ser Ser Arg
1010                1015                1020

gac  aaa gac aaa gct gag  agg aag aga aaa gca  gag att gcc aga         3411
Asp  Lys Asp Lys Ala Glu  Arg Lys Arg Lys Ala  Glu Ile Ala Arg
1025                1030                1035

ctg  cgc aga gaa aag atc  atg gct cag atg tct  gaa atg cag cgg         3456
Leu  Arg Arg Glu Lys Ile  Met Ala Gln Met Ser  Glu Met Gln Arg
1040                1045                1050


cat  ttt att gat gaa aac  aaa gaa ctc ttt cag  cag aca tta gaa         3501
His  Phe Ile Asp Glu Asn  Lys Glu Leu Phe Gln  Gln Thr Leu Glu
1055                1060                1065

ctg  gat gcc tca acc tct  gct gtt ctt gat cat  agc cct gtg gct         3546
Leu  Asp Ala Ser Thr Ser  Ala Val Leu Asp His  Ser Pro Val Ala
1070                1075                1080

tca  gat atg aca ctt aca  gca ctg ggt ccc aca  caa act cag gtt         3591
Ser  Asp Met Thr Leu Thr  Ala Leu Gly Pro Thr  Gln Thr Gln Val
1085                1090                1095
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130

A

```
cct gaa caa aga caa ttc gtt aca tgt ata ttg tgt caa gag gag          3636
Pro Glu Gln Arg Gln Phe Val Thr Cys Ile Leu Cys Gln Glu Glu
1100              1105              1110

caa gaa gtt aaa gtg gaa agc agg gca atg gtc ttg gca gca ttt          3681
Gln Glu Val Lys Val Glu Ser Arg Ala Met Val Leu Ala Ala Phe
1115              1120              1125

gtt cag aga tca act gta tta tca aaa aac aga agt aaa ttt att          3726
Val Gln Arg Ser Thr Val Leu Ser Lys Asn Arg Ser Lys Phe Ile
1130              1135              1140

caa gat cca gaa aaa tat gat cca tta ttc atg cac cct gat ctg          3771
Gln Asp Pro Glu Lys Tyr Asp Pro Leu Phe Met His Pro Asp Leu
1145              1150              1155

tct tgt gga aca cac act agt agc tgt ggg cac att atg cat gcc          3816
Ser Cys Gly Thr His Thr Ser Ser Cys Gly His Ile Met His Ala
1160              1165              1170

cat tgt tgg caa agg tat ttt gat tcc gtt caa gct aaa gaa cag          3861
His Cys Trp Gln Arg Tyr Phe Asp Ser Val Gln Ala Lys Glu Gln
1175              1180              1185

cga agg caa cag aga tta cgc tta cat acg agc tat gat gta gaa          3906
Arg Arg Gln Gln Arg Leu Arg Leu His Thr Ser Tyr Asp Val Glu
1190              1195              1200

aac gga gaa ttc ctt tgc ccc ctt tgt gaa tgc ttg agt aat act          3951
Asn Gly Glu Phe Leu Cys Pro Leu Cys Glu Cys Leu Ser Asn Thr
1205              1210              1215

gtt att cct ctg ctg ctt cct cca aga aat att ttt aac aac agg          3996
Val Ile Pro Leu Leu Leu Pro Pro Arg Asn Ile Phe Asn Asn Arg
1220              1225              1230

tta aat ttt tca gac caa cca aat ctg act cag tgg att aga aca          4041
Leu Asn Phe Ser Asp Gln Pro Asn Leu Thr Gln Trp Ile Arg Thr
1235              1240              1245

ata tct cag caa ata aaa gca tta cag ttt ctt agg aaa gaa gaa          4086
Ile Ser Gln Gln Ile Lys Ala Leu Gln Phe Leu Arg Lys Glu Glu
1250              1255              1260

agt act cct aat aat gcc tct aca aag aat tca gaa aat gtg gat          4131
Ser Thr Pro Asn Asn Ala Ser Thr Lys Asn Ser Glu Asn Val Asp
1265              1270              1275

gaa tta cag ctc cct gaa ggg ttc agg cct gat ttt cgt cct aag          4176
Glu Leu Gln Leu Pro Glu Gly Phe Arg Pro Asp Phe Arg Pro Lys
1280              1285              1290

atc cct tat tct gag agc ata aaa gaa atg cta acg aca ttt gga          4221
Ile Pro Tyr Ser Glu Ser Ile Lys Glu Met Leu Thr Thr Phe Gly
1295              1300              1305

act gct acc tac aag gtg gga cta aag gtt cat ccc aat gaa gag          4266
Thr Ala Thr Tyr Lys Val Gly Leu Lys Val His Pro Asn Glu Glu
1310              1315              1320
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-20-

131

A

```
gat  cct cgt gtt ccc ata  atg tgt tgg ggt agc  tgc gcg tac acc        4311
Asp  Pro Arg Val Pro Ile  Met Cys Trp Gly Ser  Cys Ala Tyr Thr
1325               1330             1335

atc  caa agc ata gaa aga  att ttg agt gat gaa  gat aaa cca ttg        4356
Ile  Gln Ser Ile Glu Arg  Ile Leu Ser Asp Glu  Asp Lys Pro Leu
1340               1345             1350

ttt  ggt cct tta cct tgc  aga ctg gat gac tgt  ctt agg tca ttg        4401
Phe  Gly Pro Leu Pro Cys  Arg Leu Asp Asp Cys  Leu Arg Ser Leu
1355               1360             1365

acg  aga ttt gcc gca gca  cac tgg aca gtg gca  tca gtt tca gtg        4446
Thr  Arg Phe Ala Ala Ala  His Trp Thr Val Ala  Ser Val Ser Val
1370               1375             1380

gtg  caa gga cat ttt tgt  aaa ctt ttt gca tca  ctg gtg cct aat        4491
Val  Gln Gly His Phe Cys  Lys Leu Phe Ala Ser  Leu Val Pro Asn
1385               1390             1395


gac  agc cat gag gaa ctt  cca tgc ata tta gat  att gac atg ttt        4536
Asp  Ser His Glu Glu Leu  Pro Cys Ile Leu Asp  Ile Asp Met Phe
1400               1405             1410

cat  tta ttg gtg ggc ttg  gtg ctt gca ttt cct  gcg ttg cag tgt        4581
His  Leu Leu Val Gly Leu  Val Leu Ala Phe Pro  Ala Leu Gln Cys
1415               1420             1425

cag  gat ttt tca ggg atc  agc ctt ggc act gga  gac ctt cac att        4626
Gln  Asp Phe Ser Gly Ile  Ser Leu Gly Thr Gly  Asp Leu His Ile
1430               1435             1440

ttc  cat ctg gtt act atg  gca cac atc ata cag  atc tta ctt acc        4671
Phe  His Leu Val Thr Met  Ala His Ile Ile Gln  Ile Leu Leu Thr
1445               1450             1455

tca  tgt aca gaa gag aat  ggc atg gat caa gaa  aat ccc cct tgt        4716
Ser  Cys Thr Glu Glu Asn  Gly Met Asp Gln Glu  Asn Pro Pro Cys
1460               1465             1470

gaa  gaa gaa tca gca gtt  ctt gct ttg tat aaa  aca ctt cac cag        4761
Glu  Glu Glu Ser Ala Val  Leu Ala Leu Tyr Lys  Thr Leu His Gln
1475               1480             1485

tat  acg gga agt gcc ttg  aaa gaa ata cca tcc  ggc tgg cat ctg        4806
Tyr  Thr Gly Ser Ala Leu  Lys Glu Ile Pro Ser  Gly Trp His Leu
1490               1495             1500


tgg  agg agt gtc aga gct  gga atc atg cct ttc  ctg aag tgt tct        4851
Trp  Arg Ser Val Arg Ala  Gly Ile Met Pro Phe  Leu Lys Cys Ser
1505               1510             1515

gct  tta ttt ttt cat tac  tta aat gga gtt cct  tcc cca ccc gac        4896
Ala  Leu Phe Phe His Tyr  Leu Asn Gly Val Pro  Ser Pro Pro Asp
1520               1525             1530

att  caa gtt cct gga aca  agc cat ttt gaa cat  tta tgt agc tat        4941
Ile  Gln Val Pro Gly Thr  Ser His Phe Glu His  Leu Cys Ser Tyr
1535               1540             1545
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-21-

132

```
ctt  tcc  cta  cca  aac  aac   ctc  att  tgc  ctt  ttt   caa  gaa  aat  agt        4986
Leu  Ser  Leu  Pro  Asn  Asn   Leu  Ile  Cys  Leu  Phe   Gln  Glu  Asn  Ser
1550                 1555                      1560

gag  ata  atg  aat  tca  ctg   att  gaa  agt  tgg  tgc   cgt  aac  agt  gaa        5031
Glu  Ile  Met  Asn  Ser  Leu   Ile  Glu  Ser  Trp  Cys   Arg  Asn  Ser  Glu
1565                 1570                      1575

gtt  aaa  aga  tat  cta  gaa   ggt  gaa  aga  gat  gct   ata  aga  tat  cca        5076
Val  Lys  Arg  Tyr  Leu  Glu   Gly  Glu  Arg  Asp  Ala   Ile  Arg  Tyr  Pro
1580                 1585                      1590

aga  gaa  tct  aac  aaa  tta   ata  aac  ctt  cca  gag   gat  tac  agc  agc        5121
Arg  Glu  Ser  Asn  Lys  Leu   Ile  Asn  Leu  Pro  Glu   Asp  Tyr  Ser  Ser
1595                 1600                      1605


ctc  att  aat  caa  gca  tcc   aat  ttc  tcg  tgc  ccg   aaa  tca  ggt  ggt        5166
Leu  Ile  Asn  Gln  Ala  Ser   Asn  Phe  Ser  Cys  Pro   Lys  Ser  Gly  Gly
1610                 1615                      1620

gat  aag  agc  aga  gcc  cca   act  ctg  tgc  ctt  gtg   tgc  gga  tct  ctg        5211
Asp  Lys  Ser  Arg  Ala  Pro   Thr  Leu  Cys  Leu  Val   Cys  Gly  Ser  Leu
1625                 1630                      1635

ctg  tgc  tcc  cag  agt  tac   tgc  tgc  cag  act  gaa   ctg  gaa  ggg  gag        5256
Leu  Cys  Ser  Gln  Ser  Tyr   Cys  Cys  Gln  Thr  Glu   Leu  Glu  Gly  Glu
1640                 1645                      1650

gat  gta  gga  gcc  tgc  aca   gct  cac  acc  tac  tcc   tgt  ggc  tct  gga        5301
Asp  Val  Gly  Ala  Cys  Thr   Ala  His  Thr  Tyr  Ser   Cys  Gly  Ser  Gly
1655                 1660                      1665

gtg  ggc  atc  ttc  ctg  aga   gta  cgg  gaa  tgt  cag   gtg  cta  ttt  tta        5346
Val  Gly  Ile  Phe  Leu  Arg   Val  Arg  Glu  Cys  Gln   Val  Leu  Phe  Leu
1670                 1675                      1680

gct  ggc  aaa  acc  aaa  ggc   tgt  ttt  tat  tct  cct   cct  tac  ctt  gat        5391
Ala  Gly  Lys  Thr  Lys  Gly   Cys  Phe  Tyr  Ser  Pro   Pro  Tyr  Leu  Asp
1685                 1690                      1695

gac  tat  ggg  gag  acc  gac   cag  gga  ctc  aga  cgg   gga  aat  cct  tta        5436
Asp  Tyr  Gly  Glu  Thr  Asp   Gln  Gly  Leu  Arg  Arg   Gly  Asn  Pro  Leu
1700                 1705                      1710

cat  tta  tgc  aaa  gag  cga   ttc  aag  aag  att  cag   aag  ctc  tgg  cac        5481
His  Leu  Cys  Lys  Glu  Arg   Phe  Lys  Lys  Ile  Gln   Lys  Leu  Trp  His
1715                 1720                      1725


caa  cac  agt  gtc  aca  gag   gaa  att  gga  cat  gca   cag  gaa  gcc  aat        5526
Gln  His  Ser  Val  Thr  Glu   Glu  Ile  Gly  His  Ala   Gln  Glu  Ala  Asn
1730                 1735                      1740

cag  aca  ctg  gtt  ggc  att   gac  tgg  caa  cat  tta   taattattgc              5569
Gln  Thr  Leu  Val  Gly  Ile   Asp  Trp  Gln  His  Leu
1745                 1750                      1755


accaccaaaa  aacacaaact  tggattttttt  taacccagtt  ggcttttttaa  gaaagaaaga       5629

agttctgctg  aatttggaaa  taaattctttt  atttaaactt  tccttcccag  ttttatagtt        5689

tctggttctg  aggactgatg  aaaatcatct  tccatcagca  gattttcttg  cactgtttgc         5749
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-22-

133

```
tgtgcccctc aaatataatg tcttgggttt taagatcgag caaggagctt ctcttcctag    5809

attggatccc agcccctttg tggggtctg actgcatagt cccagccatt atgtgatatt     5869

tcacgttatt gatgatagtg aaccgtgggt ccgaagctga ctcaacggag gcagggaaca    5929

aagtctctgt ggtctgttgg gtcatacttc ctggttccac tgagtggccc aacactggga    5989

ctgggttggt gtccctctg ctgacaggac cctactccta ggagcaaagt ggttgatttt      6049

gaaggcagtg ttcccttctc tccattgact atgagagagt tgggggacac acatgcagaa    6109

gaagcccgtg gggagaaggt ggattcctgg tgtgctggct ggtttttcag ggctgttaga    6169

ggtttttttt ttctttttt tttttatggc aagactttg ctttgagaa aactcactta        6229

gagggctttc caaaaactta ggatggtcta aaaaattagg atattctttt agaattagga    6289

agaaaaatta g                                                          6300
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<210> 4
<211> 1755
<212> PRT
<213> Homo sapiens

<400> 4
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Met Ala Ser Glu Leu Glu Pro Glu Val Gln Ala Ile Asp Arg Ser Leu
1               5                  10                  15

Leu Glu Cys Ser Ala Glu Glu Ile Ala Gly Lys Trp Leu Gln Ala Thr
            20                  25                  30

Asp Leu Thr Arg Glu Val Tyr Gln His Leu Ala His Tyr Val Pro Lys
        35                  40                  45

Ile Tyr Cys Arg Gly Pro Asn Pro Phe Pro Gln Lys Glu Asp Met Leu
    50                  55                  60

Ala Gln His Val Leu Leu Gly Pro Met Glu Trp Tyr Leu Cys Gly Glu
65                  70                  75                  80

Asp Pro Ala Phe Gly Phe Pro Lys Leu Glu Gln Ala Asn Lys Pro Ser
                85                  90                  95

His Leu Cys Gly Arg Val Phe Lys Val Gly Glu Pro Thr Tyr Ser Cys
            100                 105                 110

Arg Asp Cys Ala Val Asp Pro Thr Cys Val Leu Cys Met Glu Cys Phe
            115                 120                 125

Leu Gly Ser Ile His Arg Asp His Arg Tyr Arg Met Thr Thr Ser Gly
    130                 135                 140

Gly Gly Gly Phe Cys Asp Cys Gly Asp Thr Glu Ala Trp Lys Glu Gly
145                 150                 155                 160

Pro Tyr Cys Gln Lys His Glu Leu Asn Thr Ser Glu Ile Glu Glu Glu
                165                 170                 175

Glu Asp Pro Leu Val His Leu Ser Glu Asp Val Ile Ala Arg Thr Tyr
            180                 185                 190
```

-23-

134

```
Asn Ile Phe Ala Ile Thr Phe Arg Tyr Ala Val Glu Ile Leu Thr Trp
    195                     200                 205

Glu Lys Glu Ser Glu Leu Pro Ala Asp Leu Glu Met Val Glu Lys Ser
    210                 215                 220


Asp Thr Tyr Tyr Cys Met Leu Phe Asn Asp Glu Val His Thr Tyr Glu
225                     230                 235                 240

Gln Val Ile Tyr Thr Leu Gln Lys Ala Val Asn Cys Thr Gln Lys Glu
                245                 250                 255

Ala Ile Gly Phe Ala Thr Thr Val Asp Arg Asp Gly Arg Arg Ser Val
                260                 265                 270

Arg Tyr Gly Asp Phe Gln Tyr Cys Glu Gln Ala Lys Ser Val Ile Val
            275                 280                 285

Arg Asn Thr Ser Arg Gln Thr Lys Pro Leu Lys Val Gln Val Met His
    290                 295                 300

Ser Ser Ile Val Ala His Gln Asn Phe Gly Leu Lys Leu Leu Ser Trp
305                     310                 315                 320

Leu Gly Ser Ile Ile Gly Tyr Ser Asp Gly Leu Arg Arg Ile Leu Cys
                325                 330                 335

Gln Val Gly Leu Gln Glu Gly Pro Asp Gly Glu Asn Ser Ser Leu Val
            340                 345                 350

Asp Arg Leu Met Leu Ser Asp Ser Lys Leu Trp Lys Gly Ala Arg Ser
            355                 360                 365

Val Tyr His Gln Leu Phe Met Ser Ser Leu Leu Met Asp Leu Lys Tyr
    370                 375                 380

Lys Lys Leu Phe Ala Val Arg Phe Ala Lys Asn Tyr Gln Gln Leu Gln
385                 390                 395                 400

Arg Asp Phe Met Glu Asp Asp His Glu Arg Ala Val Ser Val Thr Ala
                405                 410                 415

Leu Ser Val Gln Phe Phe Thr Ala Pro Thr Leu Ala Arg Met Leu Ile
            420                 425                 430

Thr Glu Glu Asn Leu Met Ser Ile Ile Ile Lys Thr Phe Met Asp His
    435                 440                 445

Leu Arg His Arg Asp Ala Gln Gly Arg Phe Gln Phe Glu Arg Tyr Thr
    450                 455                 460

Ala Leu Gln Ala Phe Lys Phe Arg Arg Val Gln Ser Leu Ile Leu Asp
465                 470                 475                 480

Leu Lys Tyr Val Leu Ile Ser Lys Pro Thr Glu Trp Ser Asp Glu Leu
            485                 490                 495

Arg Gln Lys Phe Leu Glu Gly Phe Asp Ala Phe Leu Glu Leu Leu Lys
            500                 505                 510

Cys Met Gln Gly Met Asp Pro Ile Thr Arg Gln Val Gly Gln His Ile
            515                 520                 525
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-24-

```
Glu Met Glu Pro Glu Trp Glu Ala Ala Phe Thr Leu Gln Met Lys Leu
    530             535                 540

Thr His Val Ile Ser Met Met Gln Asp Trp Cys Ala Ser Asp Glu Lys
545             550             555                 560

Val Leu Ile Glu Ala Tyr Lys Lys Cys Leu Ala Val Leu Met Gln Cys
                565             570                 575

His Gly Gly Tyr Thr Asp Gly Glu Gln Pro Ile Thr Leu Ser Ile Cys
            580             585                 590

Gly His Ser Val Glu Thr Ile Arg Tyr Cys Val Ser Gln Glu Lys Val
        595             600             605

Ser Ile His Leu Pro Val Ser Arg Leu Leu Ala Gly Leu His Val Leu
    610             615             620

Leu Ser Lys Ser Glu Val Ala Tyr Lys Phe Pro Glu Leu Leu Pro Leu
625             630             635                 640

Ser Glu Leu Ser Pro Pro Met Leu Ile Glu His Pro Leu Arg Cys Leu
            645             650             655

Val Leu Cys Ala Gln Val His Ala Gly Met Trp Arg Arg Asn Gly Phe
            660             665             670

Ser Leu Val Asn Gln Ile Tyr Tyr Tyr His Asn Val Lys Cys Arg Arg
        675             680             685

Glu Met Phe Asp Lys Asp Val Val Met Leu Gln Thr Gly Val Ser Met
    690             695             700

Met Asp Pro Asn His Phe Leu Met Ile Met Leu Ser Arg Phe Glu Leu
705             710             715                 720

Tyr Gln Ile Phe Ser Thr Pro Asp Tyr Gly Lys Arg Phe Ser Ser Glu
            725             730             735

Ile Thr His Lys Asp Val Val Gln Gln Asn Asn Thr Leu Ile Glu Glu
            740             745             750

Met Leu Tyr Leu Ile Ile Met Leu Val Gly Glu Arg Phe Ser Pro Gly
        755             760             765

Val Gly Gln Val Asn Ala Thr Asp Glu Ile Lys Arg Glu Ile Ile His
    770             775             780

Gln Leu Ser Ile Lys Pro Met Ala His Ser Glu Leu Val Lys Ser Leu
785             790             795                 800

Pro Glu Asp Glu Asn Lys Glu Thr Gly Met Glu Ser Val Ile Glu Ala
            805             810             815

Val Ala His Phe Lys Lys Pro Gly Leu Thr Gly Arg Gly Met Tyr Glu
        820             825             830

Leu Lys Pro Glu Cys Ala Lys Glu Phe Asn Leu Tyr Phe Tyr His Phe
        835             840             845
```

-25-

136

A

```
Ser Arg Ala Glu Gln Ser Lys Ala Glu Glu Ala Gln Arg Lys Leu Lys
    850             855             860

Arg Gln Asn Arg Glu Asp Thr Ala Leu Pro Pro Pro Val Leu Pro Pro
865             870             875             880

Phe Cys Pro Leu Phe Ala Ser Leu Val Asn Ile Leu Gln Ser Asp Val
            885             890             895

Met Leu Cys Ile Met Gly Thr Ile Leu Gln Trp Ala Val Glu His Asn
        900             905             910

Gly Tyr Ala Trp Ser Glu Ser Met Leu Gln Arg Val Leu His Leu Ile
        915             920             925

Gly Met Ala Leu Gln Glu Glu Lys Gln His Leu Glu Asn Val Thr Glu
    930             935             940

Glu His Val Val Thr Phe Thr Phe Thr Gln Lys Ile Ser Lys Pro Gly
945             950             955             960

Glu Ala Pro Lys Asn Ser Pro Ser Ile Leu Ala Met Leu Glu Thr Leu
            965             970             975

Gln Asn Ala Pro Tyr Leu Glu Val His Lys Asp Met Ile Arg Trp Ile
        980             985             990

Leu Lys Thr Phe Asn Ala Val Lys  Lys Met Arg Glu Ser  Ser Pro Thr
        995             1000            1005

Ser Pro  Val Ala Glu Thr Glu  Gly Thr Ile Met Glu ·Glu Ser Ser
    1010            1015            1020

Arg Asp  Lys Asp Lys Ala Glu  Arg Lys Arg Lys Ala  Glu Ile Ala
    1025            1030            1035

Arg Leu  Arg Arg Glu Lys Ile  Met Ala Gln Met Ser  Glu Met Gln
    1040            1045            1050

Arg His  Phe Ile Asp Glu Asn  Lys Glu Leu Phe Gln  Gln Thr Leu
    1055            1060            1065

Glu Leu  Asp Ala Ser Thr Ser  Ala Val Leu Asp His  Ser Pro Val
    1070            1075            1080

Ala Ser  Asp Met Thr Leu Thr  Ala Leu Gly Pro Thr  Gln Thr Gln
    1085            1090            1095

Val Pro  Glu Gln Arg Gln Phe  Val Thr Cys Ile Leu  Cys Gln Glu
    1100            1105            1110

Glu Gln  Glu Val Lys Val Glu  Ser Arg Ala Met Val  Leu Ala Ala
    1115            1120            1125


Phe Val  Gln Arg Ser Thr Val  Leu Ser Lys Asn Arg  Ser Lys Phe
    1130            1135            1140

Ile Gln  Asp Pro Glu Lys Tyr  Asp Pro Leu Phe Met  His Pro Asp
    1145            1150            1155

Leu Ser  Cys Gly Thr His Thr  Ser Ser Cys Gly His  Ile Met His
    1160            1165            1170
```

-26-

137

A

```
Ala His  Cys Trp Gln Arg Tyr   Phe Asp Ser Val Gln   Ala Lys Glu
    1175             1180                 1185

Gln Arg  Arg Gln Gln Arg Leu   Arg Leu His Thr Ser   Tyr Asp Val
    1190             1195                 1200

Glu Asn  Gly Glu Phe Leu Cys   Pro Leu Cys Glu Cys   Leu Ser Asn
    1205             1210                 1215

Thr Val  Ile Pro Leu Leu Leu   Pro Pro Arg Asn Ile   Phe Asn Asn
    1220             1225                 1230

Arg Leu  Asn Phe Ser Asp Gln   Pro Asn Leu Thr Gln   Trp Ile Arg
    1235             1240                 1245

Thr Ile  Ser Gln Gln Ile Lys   Ala Leu Gln Phe Leu   Arg Lys Glu
    1250             1255                 1260

Glu Ser  Thr Pro Asn Asn Ala   Ser Thr Lys Asn Ser   Glu Asn Val
    1265             1270                 1275

Asp Glu  Leu Gln Leu Pro Glu   Gly Phe Arg Pro Asp   Phe Arg Pro
    1280             1285                 1290

Lys Ile  Pro Tyr Ser Glu Ser   Ile Lys Glu Met Leu   Thr Thr Phe
    1295             1300                 1305

Gly Thr  Ala Thr Tyr Lys Val   Gly Leu Lys Val His   Pro Asn Glu
    1310             1315                 1320

Glu Asp  Pro Arg Val Pro Ile   Met Cys Trp Gly Ser   Cys Ala Tyr
    1325             1330                 1335

Thr Ile  Gln Ser Ile Glu Arg   Ile Leu Ser Asp Glu   Asp Lys Pro
    1340             1345                 1350

Leu Phe  Gly Pro Leu Pro Cys   Arg Leu Asp Asp Cys   Leu Arg Ser
    1355             1360                 1365

Leu Thr  Arg Phe Ala Ala Ala   His Trp Thr Val Ala   Ser Val Ser
    1370             1375                 1380

Val Val  Gln Gly His Phe Cys   Lys Leu Phe Ala Ser   Leu Val Pro
    1385             1390                 1395

Asn Asp  Ser His Glu Glu Leu   Pro Cys Ile Leu Asp   Ile Asp Met
    1400             1405                 1410

Phe His  Leu Leu Val Gly Leu   Val Leu Ala Phe Pro   Ala Leu Gln
    1415             1420                 1425

Cys Gln  Asp Phe Ser Gly Ile   Ser Leu Gly Thr Gly   Asp Leu His
    1430             1435                 1440

Ile Phe  His Leu Val Thr Met   Ala His Ile Ile Gln   Ile Leu Leu
    1445             1450                 1455

Thr Ser  Cys Thr Glu Glu Asn   Gly Met Asp Gln Glu   Asn Pro Pro
    1460             1465                 1470

Cys Glu  Glu Glu Ser Ala Val   Leu Ala Leu Tyr Lys   Thr Leu His
    1475             1480                 1485
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-27-

138

A

```
Gln Tyr  Thr Gly Ser Ala Leu  Lys Glu Ile Pro Ser  Gly Trp His
1490                1495                1500

Leu Trp  Arg Ser Val Arg Ala  Gly Ile Met Pro Phe  Leu Lys Cys
1505                1510                1515

Ser Ala  Leu Phe Phe His Tyr  Leu Asn Gly Val Pro  Ser Pro Pro
1520                1525                1530

Asp Ile  Gln Val Pro Gly Thr  Ser His Phe Glu His  Leu Cys Ser
1535                1540                1545

Tyr Leu  Ser Leu Pro Asn Asn  Leu Ile Cys Leu Phe  Gln Glu Asn
1550                1555                1560

Ser Glu  Ile Met Asn Ser Leu  Ile Glu Ser Trp Cys  Arg Asn Ser
1565                1570                1575

Glu Val  Lys Arg Tyr Leu Glu  Gly Glu Arg Asp Ala  Ile Arg Tyr
1580                1585                1590

Pro Arg  Glu Ser Asn Lys Leu  Ile Asn Leu Pro Glu  Asp Tyr Ser
1595                1600                1605

Ser Leu  Ile Asn Gln Ala Ser  Asn Phe Ser Cys Pro  Lys Ser Gly
1610                1615                1620

Gly Asp  Lys Ser Arg Ala Pro  Thr Leu Cys Leu Val  Cys Gly Ser
1625                1630                1635

Leu Leu  Cys Ser Gln Ser Tyr  Cys Cys Gln Thr Glu  Leu Glu Gly
1640                1645                1650

Glu Asp  Val Gly Ala Cys Thr  Ala His Thr Tyr Ser  Cys Gly Ser
1655                1660                1665

Gly Val  Gly Ile Phe Leu Arg  Val Arg Glu Cys Gln  Val Leu Phe
1670                1675                1680

Leu Ala  Gly Lys Thr Lys Gly  Cys Phe Tyr Ser Pro  Pro Tyr Leu
1685                1690                1695


Asp Asp  Tyr Gly Glu Thr Asp  Gln Gly Leu Arg Arg  Gly Asn Pro
1700                1705                1710

Leu His  Leu Cys Lys Glu Arg  Phe Lys Lys Ile Gln  Lys Leu Trp
1715                1720                1725

His Gln  His Ser Val Thr Glu  Glu Ile Gly His Ala  Gln Glu Ala
1730                1735                1740

Asn Gln  Thr Leu Val Gly Ile  Asp Trp Gln His Leu
1745                1750                1755


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<213>   Mouse
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-28-

139

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cggtttgact cacggggatt tccaagtctc caccccattg acgtcaatgg gagtttgttt     240

tggcaccaaa atcaacggga ctttccaaaa tgtcgtaaca actccgcccc attgacgcaa     300

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ctgggcgccg agcccgggcg cgcgcgcaag cggctgccgt ccccgctgca ggttcgcgtc     600

ccgctttgct cctcgcgcat ctcggctcgg cggcagcccg acggcccgg gactgacggc      660

cccaggacag gggtgaccgt cgcggctgcg ggagcagagg cgaagctgag gcccggggag     720

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gtcattgtga ggaacaccag cagacagacc aagccgctca agttcaagt tatgcactcc     1680

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-29-

140

A

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gctaggagtg tgtatcacca gttgttcatg agcagcctgc tcatggacct caagtataag   1920

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gatgatcacg agcgggcagt gtcggtgact gctctgtctg tccagttctt caccgcaccg   2040

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atggaccatt tgaaacacag agatgcccag ggcagattcc agtttgaacg ctacactgcc   2160

ctccaagcct tcaagttcag gagagtccag agcctcatct tagatctcaa gtatgtattg   2220

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ccaatcacac tcagtatttg tggacactcg gtggaaacca tcagatactg tgtttcccaa   2580

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agcaaaagtg aagtggcata taaatttcca gagctcctac ctctaagtga actgagccca   2700

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141

A

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atggcccaga tgtctgagat gcagcggcac ttcattgacg aaaacaaaga gctcttccag   3960

cagaccctag agctggacac ctctgcctct gccactcttg acagcagccc tcccgtttca   4020

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-31-

142

A

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tgctgccaag ctgagctgga gggtgaggac gtcggagcct gcacagcaca cacctactcc   5760

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aagctctggc agcagcatag tatcacagag gagatcggac acgcgcagga ggctaaccag   6000

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Leu Glu Cys Ser Ala Glu Glu Ile Ala Gly Arg Trp Leu Gln Ala Thr
            20                  25                  30

Asp Leu Asn Arg Glu Val Tyr Gln His Leu Ala His Cys Val Pro Lys
            35                  40                  45

Ile Tyr Cys Arg Gly Pro Asn Pro Phe Pro Gln Lys Glu Asp Thr Leu
        50                  55                  60

Ala Gln His Ile Leu Leu Gly Pro Met Glu Trp Tyr Ile Cys Ala Glu
65                  70                  75                  80

Asp Pro Ala Leu Gly Phe Pro Lys Leu Glu Gln Ala Asn Lys Pro Ser
                85                  90                  95

His Leu Cys Gly Arg Val Phe Lys Val Gly Glu Pro Thr Tyr Ser Cys
            100                 105                 110

Arg Asp Cys Ala Val Asp Pro Thr Cys Val Leu Cys Met Glu Cys Phe
            115                 120                 125

Leu Gly Ser Ile His Arg Asp His Arg Tyr Arg Met Thr Thr Ser Gly
    130                 135                 140

Gly Gly Gly Phe Cys Asp Cys Gly Asp Thr Glu Ala Trp Lys Glu Gly
145                 150                 155                 160

Pro Tyr Cys Gln Lys His Lys Leu Ser Ser Ser Glu Val Val Glu Glu
                165                 170                 175

Glu Asp Pro Leu Val His Leu Ser Glu Asp Val Ile Ala Arg Thr Tyr
            180                 185                 190

Asn Ile Phe Ala Ile Met Phe Arg Tyr Ala Val Asp Ile Leu Thr Trp
        195                 200                 205

Glu Lys Glu Ser Glu Leu Pro Glu Asp Leu Glu Val Ala Glu Lys Ser
    210                 215                 220
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-32-

143

A

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Asp Thr Tyr Tyr Cys Met Leu Phe Asn Asp Glu Val His Thr Tyr Glu
225             230             235             240

Gln Val Ile Tyr Thr Leu Gln Lys Ala Val Asn Cys Thr Gln Lys Glu
            245             250             255

Ala Ile Gly Phe Ala Thr Thr Val Asp Arg Asp Gly Arg Arg Pro Val
            260             265             270

Arg Tyr Gly Asp Phe Gln Tyr Cys Asp Gln Ala Lys Thr Val Ile Val
        275             280             285

Arg Asn Thr Ser Arg Gln Thr Lys Pro Leu Lys Val Gln Val Met His
    290             295             300

Ser Ser Val Ala Ala His Gln Asn Phe Gly Leu Lys Ala Leu Ser Trp
305             310             315             320

Leu Gly Ser Val Ile Gly Tyr Ser Asp Gly Leu Arg Arg Ile Leu Cys
            325             330             335

Gln Val Gly Leu Gln Glu Gly Pro Asp Gly Glu Asn Ser Ser Leu Val
            340             345             350

Asp Arg Leu Met Leu Asn Asp Ser Lys Leu Trp Lys Gly Ala Arg Ser
        355             360             365

Val Tyr His Gln Leu Phe Met Ser Ser Leu Leu Met Asp Leu Lys Tyr
    370             375             380

Lys Lys Leu Phe Ala Leu Arg Phe Ala Lys Asn Tyr Arg Gln Leu Gln
385             390             395             400

Arg Asp Phe Met Glu Asp Asp His Glu Arg Ala Val Ser Val Thr Ala
            405             410             415

Leu Ser Val Gln Phe Phe Thr Ala Pro Thr Leu Ala Arg Met Leu Leu
            420             425             430

Thr Glu Glu Asn Leu Met Thr Val Ile Ile Lys Ala Phe Met Asp His
        435             440             445

Leu Lys His Arg Asp Ala Gln Gly Arg Phe Gln Phe Glu Arg Tyr Thr
    450             455             460

Ala Leu Gln Ala Phe Lys Phe Arg Arg Val Gln Ser Leu Ile Leu Asp
465             470             475             480

Leu Lys Tyr Val Leu Ile Ser Lys Pro Thr Glu Trp Ser Asp Glu Leu
            485             490             495

Arg Gln Lys Phe Leu Gln Gly Phe Asp Ala Phe Leu Glu Leu Leu Lys
        500             505             510

Cys Met Gln Gly Met Asp Pro Ile Thr Arg Gln Val Gly Gln His Ile
        515             520             525

Glu Met Glu Pro Glu Trp Glu Ala Ala Phe Thr Leu Gln Met Lys Leu
    530             535             540
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-33-

144

Thr His Val Ile Ser Met Val Gln Asp Trp Cys Ala Leu Asp Glu Lys
545   550   555   560

Val Leu Ile Glu Ala Tyr Lys Lys Cys Leu Ala Val Leu Thr Gln Cys
565   570   575

His Gly Gly Phe Thr Asp Gly Glu Gln Pro Ile Thr Leu Ser Ile Cys
580   585   590

Gly His Ser Val Glu Thr Ile Arg Tyr Cys Val Ser Gln Glu Lys Val
595   600   605

Ser Ile His Leu Pro Ile Ser Arg Leu Leu Ala Gly Leu His Val Leu
610   615   620

Leu Ser Lys Ser Glu Val Ala Tyr Lys Phe Pro Glu Leu Leu Pro Leu
625   630   635   640

Ser Glu Leu Ser Pro Pro Met Leu Ile Glu His Pro Leu Arg Cys Leu
645   650   655

Val Leu Cys Ala Gln Val His Ala Gly Met Trp Arg Arg Asn Gly Phe
660   665   670

Ser Leu Val Asn Gln Ile Tyr Tyr Tyr His Asn Val Lys Cys Arg Arg
675   680   685

Glu Met Phe Asp Lys Asp Ile Val Met Leu Gln Thr Gly Val Ser Met
690   695   700

Met Asp Pro Asn His Phe Leu Met Ile Met Leu Ser Arg Phe Glu Leu
705   710   715   720

Tyr Gln Leu Phe Ser Thr Pro Asp Tyr Gly Lys Arg Phe Ser Ser Glu
725   730   735

Val Thr His Lys Asp Val Val Gln Gln Asn Asn Thr Leu Ile Glu Glu
740   745   750

Met Leu Tyr Leu Ile Ile Met Leu Val Gly Glu Arg Phe Asn Pro Gly
755   760   765

Val Gly Gln Val Ala Ala Thr Asp Glu Ile Lys Arg Glu Ile Ile His
770   775   780

Gln Leu Ser Ile Lys Pro Met Ala His Ser Glu Leu Val Lys Ser Leu
785   790   795   800

Pro Glu Asp Glu Asn Lys Glu Thr Gly Met Glu Ser Val Ile Glu Ser
805   810   815

Val Ala His Phe Lys Lys Pro Gly Leu Thr Gly Arg Gly Met Tyr Glu
820   825   830

Leu Lys Pro Glu Cys Ala Lys Glu Phe Asn Leu Tyr Phe Tyr His Phe
835   840   845

Ser Arg Ala Glu Gln Ser Lys Ala Glu Glu Ala Gln Arg Lys Leu Lys
850   855   860

Arg Glu Asn Lys Glu Asp Thr Ala Leu Pro Pro Pro Ala Leu Pro Pro
865   870   875   880

-34-

145

A

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Phe Cys Pro Leu Phe Ala Ser Leu Val Asn Ile Leu Gln Cys Asp Val
              885                 890                 895

Met Leu Tyr Ile Met Gly Thr Ile Leu Gln Trp Ala Val Glu His His
              900                 905                 910

Gly Ser Ala Trp Ser Glu Ser Met Leu Gln Arg Val Leu His Leu Ile
              915                 920                 925

Gly Met Ala Leu Gln Glu Glu Lys His His Leu Glu Asn Ala Val Glu
          930                 935                 940

Gly His Val Gln Thr Phe Thr Phe Thr Gln Lys Ile Ser Lys Pro Gly
      945                 950                 955                 960

Asp Ala Pro His Asn Ser Pro Ser Ile Leu Ala Met Leu Glu Thr Leu
                  965                 970                 975

Gln Asn Ala Pro Ser Leu Glu Ala His Lys Asp Met Ile Arg Trp Leu
              980                 985                 990

Leu Lys Met Phe Asn Ala Ile Lys  Lys Ile Arg Glu Cys  Ser Ser Ser
          995                 1000                1005

Ser Pro  Val Ala Glu Ala Glu  Gly Thr Ile Met Glu  Glu Ser Ser
    1010                 1015                1020

Arg Asp  Lys Asp Lys Ala Glu  Arg Lys Arg Lys Ala  Glu Ile Ala
    1025                 1030                1035

Arg Leu  Arg Arg Glu Lys Ile  Met Ala Gln Met Ser  Glu Met Gln
    1040                 1045                1050

Arg His  Phe Ile Asp Glu Asn  Lys Glu Leu Phe Gln  Gln Thr Leu
    1055                 1060                1065

Glu Leu  Asp Thr Ser Ala Ser  Ala Thr Leu Asp Ser  Ser Pro Pro
    1070                 1075                1080

Val Ser  Asp Ala Ala Leu Thr  Ala Leu Gly Pro Ala  Gln Thr Gln
    1085                 1090                1095

Val Pro  Glu Pro Arg Gln Phe  Val Thr Cys Ile Leu  Cys Gln Glu
    1100                 1105                1110

Glu Gln  Glu Val Thr Val Gly  Ser Arg Ala Met Val  Leu Ala Ala
    1115                 1120                1125

Phe Val  Gln Arg Ser Thr Val  Leu Ser Lys Asp Arg  Thr Lys Thr
    1130                 1135                1140

Ile Ala  Asp Pro Glu Lys Tyr  Asp Pro Leu Phe Met  His Pro Asp
    1145                 1150                1155

Leu Ser  Cys Gly Thr His Thr  Gly Ser Cys Gly His  Val Met His
    1160                 1165                1170

Ala His  Cys Trp Gln Arg Tyr  Phe Asp Ser Val Gln  Ala Lys Glu
    1175                 1180                1185

Gln Arg  Arg Gln Gln Arg Leu  Arg Leu His Thr Ser  Tyr Asp Val
    1190                 1195                1200
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146

A

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Glu Asn Gly Glu Phe Leu Cys   Pro Leu Cys Glu Cys   Leu Ser Asn
    1205                1210            1215

Thr Val Ile Pro Leu Leu Leu   Pro Pro Arg Ser Ile   Leu Ser Arg
    1220                1225            1230

Arg Leu Asn Phe Ser Asp Gln   Pro Asp Leu Ala Gln   Trp Thr Arg
    1235                1240            1245

Ala Val Thr Gln Gln Ile Lys   Val Val Gln Met Leu   Arg Arg Lys
    1250                1255            1260

His Asn Ala Ala Asp Thr Ser   Ser Ser Glu Asp Thr   Glu Ala Met
    1265                1270            1275

Asn Ile Ile Pro Ile Pro Glu   Gly Phe Arg Pro Asp   Phe Tyr Pro
    1280                1285            1290

Arg Asn Pro Tyr Ser Asp Ser   Ile Lys Glu Met Leu   Thr Thr Phe
    1295                1300            1305

Gly Thr Ala Ala Tyr Lys Val   Gly Leu Lys Val His   Pro Asn Glu
    1310                1315            1320

Gly Asp Pro Arg Val Pro Ile   Leu Cys Trp Gly Thr   Cys Ala Tyr
    1325                1330            1335

Thr Ile Gln Ser Ile Glu Arg   Ile Leu Ser Asp Glu   Glu Lys Pro
    1340                1345            1350

Val Phe Gly Pro Leu Pro Cys   Arg Leu Asp Asp Cys   Leu Arg Ser
    1355                1360            1365

Leu Thr Arg Phe Ala Ala Ala   His Trp Thr Val Ala   Leu Leu Pro
    1370                1375            1380

Val Val Gln Gly His Phe Cys   Lys Leu Phe Ala Ser   Leu Val Pro
    1385                1390            1395

Ser Asp Ser Tyr Glu Asp Leu   Pro Cys Ile Leu Asp   Ile Asp Met
    1400                1405            1410

Phe His Leu Leu Val Gly Leu   Val Leu Ala Phe Pro   Ala Leu Gln
    1415                1420            1425

Cys Gln Asp Phe Ser Gly Ser   Ser Leu Ala Thr Gly   Asp Leu His
    1430                1435            1440

Ile Phe His Leu Val Thr Met   Ala His Ile Val Gln   Ile Leu Leu
    1445                1450            1455

Thr Ser Cys Thr Glu Glu Asn   Gly Met Asp Gln Glu   Asn Pro Thr
    1460                1465            1470

Gly Glu Glu Glu Leu Ala Ile   Leu Ser Leu His Lys   Thr Leu His
    1475                1480            1485

Gln Tyr Thr Gly Ser Ala Leu   Lys Glu Ala Pro Ser   Gly Trp His
    1490                1495            1500

Leu Trp Arg Ser Val Arg Ala   Ala Ile Met Pro Phe   Leu Lys Cys
    1505                1510            1515
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-36-

147

A

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Ser Ala   Leu Phe Phe His Tyr   Leu Asn Gly Val Pro   Ala Pro Pro
    1520                1525                  1530

Asp Leu   Gln Val Ser Gly Thr   Ser His Phe Glu His   Leu Cys Asn
    1535                1540                  1545

Tyr Leu   Ser Leu Pro Thr Asn   Leu Ile His Leu Phe   Gln Glu Asn
    1550                1555                  1560

Ser Asp   Ile Met Asn Ser Leu   Ile Glu Ser Trp Cys   Gln Asn Ser
    1565                1570                  1575

Glu Val   Lys Arg Tyr Leu Asn   Gly Glu Arg Gly Ala   Ile Ser Tyr
    1580                1585                  1590

Pro Arg   Gly Ala Asn Lys Leu   Ile Asp Leu Pro Glu   Asp Tyr Ser
    1595                1600                  1605

Ser Leu   Ile Asn Gln Ala Ser   Asn Phe Ser Cys Pro   Lys Ser Gly
    1610                1615                  1620

Gly Asp   Lys Ser Arg Ala Pro   Thr Leu Cys Leu Val   Cys Gly Ser
    1625                1630                  1635

Leu Leu   Cys Ser Gln Ser Tyr   Cys Cys Gln Ala Glu   Leu Glu Gly
    1640                1645                  1650

Glu Asp   Val Gly Ala Cys Thr   Ala His Thr Tyr Ser   Cys Gly Ser
    1655                1660                  1665

Gly Ala   Gly Ile Phe Leu Arg   Val Arg Glu Cys Gln   Val Leu Phe
    1670                1675                  1680

Leu Ala   Gly Lys Thr Lys Gly   Cys Phe Tyr Ser Pro   Pro Tyr Leu
    1685                1690                  1695

Asp Asp   Tyr Gly Glu Thr Asp   Gln Gly Leu Arg Arg   Gly Asn Pro
    1700                1705                  1710

Leu His   Leu Cys Gln Glu Arg   Phe Arg Lys Ile Gln   Lys Leu Trp
    1715                1720                  1725

Gln Gln   His Ser Ile Thr Glu   Glu Ile Gly His Ala   Gln Glu Ala
    1730                1735                  1740

Asn Gln   Thr Leu Val Gly Ile   Asp Trp Gln His Leu
    1745                1750                  1755


<210>   7
<211>   21
<212>   DNA
<213>   Artificial Sequence

<220>
<223>   Description of Artificial Sequence: Primer
        -2282-91

<400>   7
ctgctcgagt ctgcgtcaaa c                                            21
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148

A

```
<210>   8
<211>   24
<212>   DNA
<213>   Artificial Sequence

<220>
<223>   Description of Artificial Sequence: Primer -
        2385-35

<400>   8
tctcgatatg ttgcagcctt gcta                                          24




<210>   9
<211>   23
<212>   DNA
<213>   Artificial sequence

<220>
<223>   Description of Artificial Sequence: Primer 2282-94

<400>   9
gtatgaactt gccgaggctt tta                                           23


<210>   10
<211>   23
<212>   DNA
<213>   Artificial sequence

<220>
<223>   Description of Artificial Sequence: Primer 2294-37

<400>   10
caatactttc ccagccctca gaa                                           23


<210>   11
<211>   18
<212>   DNA
<213>   Artificial sequence

<220>
<223>   Description of Artificial Sequence: Primer 2380-88

<400>   11
atggcgtcgc tagagcca                                                 18


<210>   12
<211>   23
<212>   DNA
<213>   Artificial sequence

<220>
<223>   Description of Artificial Sequence: Primer 2378-32

<400>   12
caaagcggct gagcatgatc atc                                           23
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A

<210> 13
<211> 23
<212> DNA
<213> Artificial sequence

<220>
<223> Description of Artificial Sequence: Primer 2381-48

<400> 13
tgaacagcca atcacactaa gca   23

<210> 14
<211> 20
<212> DNA
<213> Artificial sequence

<220>
<223> Description of Artificial Sequence: Primer 2385-94

<400> 14
ttataaatgc caaatgccaa   20

<210> 15
<211> 1757
<212> PRT
<213> Mouse

<400> 15
Met Ala Asp Glu Glu Met Asp Gly Ala Glu Arg Met Asp Val Ser Pro
1   5   10   15

Glu Pro Pro Leu Ala Pro Gln Arg Pro Ala Ser Trp Trp Asp Gln Gln
            20   25   30

Val Asp Phe Tyr Thr Ala Phe Leu His His Leu Ala Gln Leu Val Pro
        35   40   45

Glu Ile Tyr Phe Ala Glu Met Asp Pro Asp Leu Glu Lys Gln Glu Glu
    50   55   60

Ser Val Gln Met Ser Ile Leu Thr Pro Leu Glu Trp Tyr Leu Phe Gly
65   70   75   80

Glu Asp Pro Asp Ile Cys Leu Glu Lys Leu Lys His Ser Gly Ala Phe
                85   90   95

Gln Leu Cys Gly Lys Val Phe Lys Ser Gly Glu Thr Thr Tyr Ser Cys
            100   105   110

Arg Asp Cys Ala Ile Asp Pro Thr Cys Val Leu Cys Met Asp Cys Phe
            115   120   125

Gln Ser Ser Val His Lys Asn His Arg Tyr Lys Met His Thr Ser Thr
        130   135   140

Gly Gly Gly Phe Cys Asp Cys Gly Asp Thr Glu Ala Trp Lys Thr Gly
145   150   155   160

-39-

150

A

Pro Phe Cys Val Asp His Glu Pro Gly Arg Ala Gly Thr Thr Lys Glu
              165   170   175

Ser Leu His Cys Pro Leu Asn Glu Glu Val Ile Ala Gln Ala Arg Arg
              180   185   190

Ile Phe Pro Ser Val Ile Lys Tyr Ile Val Glu Met Thr Ile Trp Glu
              195   200   205

Glu Glu Lys Glu Leu Pro Pro Glu Leu Gln Ile Arg Glu Lys Asn Glu
              210   215   220

Arg Tyr Tyr Cys Val Leu Phe Asn Asp Glu His His Ser Tyr Asp His
225   230   235   240

Val Ile Tyr Ser Leu Gln Arg Ala Leu Asp Cys Glu Leu Ala Glu Ala
              245   250   255

Gln Leu His Thr Thr Ala Ile Asp Lys Glu Gly Arg Arg Ala Val Lys
              260   265   270

Ala Gly Val Tyr Ala Thr Cys Gln Glu Ala Lys Glu Asp Ile Lys Ser
              275   280   285

His Ser Glu Asn Val Ser Gln His Pro Leu His Val Glu Val Leu His
              290   295   300

Ser Val Val Met Ala His Gln Lys Phe Ala Leu Arg Leu Gly Ser Trp
305   310   315   320

Met Asn Lys Ile Met Ser Tyr Ser Ser Asp Phe Arg Gln Ile Phe Cys
              325   330   335

Gln Ala Cys Leu Val Glu Glu Pro Gly Ser Glu Asn Pro Cys Leu Ile
              340   345   350

Ser Arg Leu Met Leu Trp Asp Ala Lys Leu Tyr Lys Gly Ala Arg Lys
              355   360   365

Ile Leu His Glu Leu Ile Phe Ser Ser Phe Phe Met Glu Met Glu Tyr
              370   375   380

Lys Lys Leu Phe Ala Met Glu Phe Val Lys Tyr Tyr Lys Gln Leu Gln
385   390   395   400

Lys Glu Tyr Ile Ser Asp Asp His Glu Arg Ser Ile Ser Ile Thr Ala
              405   410   415

Leu Ser Val Gln Met Leu Thr Val Pro Thr Leu Ala Arg His Leu Ile
              420   425   430

Glu Glu Gln Asn Val Ile Ser Val Ile Thr Glu Thr Leu Leu Glu Val
              435   440   445

Leu Pro Glu Tyr Leu Asp Arg Asn Asn Lys Phe Asn Phe Gln Gly Tyr
              450   455   460

Ser Gln Asp Lys Leu Gly Arg Val Tyr Ala Val Ile Cys Asp Leu Lys
465   470   475   · 480

Tyr Ile Leu Ile Ser Lys Pro Val Ile Trp Thr Glu Arg Leu Arg Ala
              485   490   495

-40-

151

A

```
Gln Phe Leu Glu Gly Phe Arg Ser Phe Leu Lys Ile Leu Thr Cys Met
            500               505               510

Gln Gly Met Glu Glu Ile Arg Arg Gln Val Gly Gln His Ile Glu Val
            515               520               525

Asp Pro Asp Trp Glu Ala Ala Ile Ala Ile Gln Met Gln Leu Lys Asn
    530               535               540

Ile Leu Leu Met Phe Gln Glu Trp Cys Ala Cys Asp Glu Asp Leu Leu
545               550               555               560

Leu Val Ala Tyr Lys Glu Cys His Lys Ala Val Met Arg Cys Ser Thr
            565               570               575

Asn Phe Met Ser Ser Thr Lys Thr Val Val Gln Leu Cys Gly His Ser
            580               585               590

Leu Glu Thr Lys Ser Tyr Lys Val Ser Glu Asp Leu Val Ser Ile His
            595               600               605

Leu Pro Leu Ser Arg Thr Leu Ala Gly Leu His Val Arg Leu Ser Arg
    610               615               620

Leu Gly Ala Ile Ser Arg Leu His Glu Phe Val Pro Phe Asp Ser Phe
625               630               635               640

Gln Val Glu Val Leu Val Glu Tyr Pro Leu Arg Cys Leu Val Leu Val
            645               650               655

Ala Gln Val Val Ala Glu Met Trp Arg Arg Asn Gly Leu Ser Leu Ile
            660               665               670

Ser Gln Val Phe Tyr Tyr Gln Asp Val Lys Cys Arg Glu Glu Met Tyr
            675               680               685

Asp Lys Asp Ile Ile Met Leu Gln Ile Gly Ala Ser Ile Met Asp Pro
    690               695               700

Asn Lys Phe Leu Leu Leu Val Leu Gln Arg Tyr Glu Leu Thr Asp Ala
705               710               715               720

Phe Asn Lys Thr Ile Ser Thr Lys Asp Gln Asp Leu Ile Lys Gln Tyr
            725               730               735

Asn Thr Leu Ile Glu Glu Met Leu Gln Val Leu Ile Tyr Ile Val Gly
            740               745               750

Glu Arg Tyr Val Pro Gly Val Gly Asn Val Thr Arg Glu Glu Val Ile
            755               760               765

Met Arg Glu Ile Thr His Leu Leu Cys Ile Glu Pro Met Pro His Ser
    770               775               780

Ala Ile Ala Arg Asn Leu Pro Glu Asn Glu Asn Asn Glu Thr Gly Leu
785               790               795               800

Glu Asn Val Ile Asn Lys Val Ala Thr Phe Lys Lys Pro Gly Val Ser
            805               810               815

Gly His Gly Val Tyr Glu Leu Lys Asp Glu Ser Leu Lys Asp Phe Asn
            820               825               830
```

-41-

152

A

Met Tyr Phe Tyr His Tyr Ser Lys Thr Gln His Ser Lys Ala Glu His
    835   840   845

Met Gln Lys Lys Arg Arg Lys Gln Glu Asn Lys Asp Glu Ala Leu Pro
    850   855   860

Pro Pro Pro Pro Pro Glu Phe Cys Pro Ala Phe Ser Lys Val Val Asn
865   870   875   880

Leu Leu Ser Cys Asp Val Met Ile Tyr Ile Leu Arg Thr Ile Phe Glu
        885   890   895

Arg Ala Val Asp Thr Glu Ser Asn Leu Trp Thr Glu Gly Met Leu Gln
        900   905   910

Met Ala Phe His Ile Leu Ala Leu Gly Leu Leu Glu Glu Lys Gln Gln
        915   920   925

Leu Gln Lys Ala Pro Glu Glu Glu Val Ala Phe Asp Phe Tyr His Lys
    930   935   940

Ala Ser Arg Leu Gly Ser Ser Ala Met Asn Ala Gln Asn Ile Gln Met
945   950   955   960

Leu Leu Glu Arg Leu Lys Gly Ile Pro Gln Leu Glu Gly Gln Lys Asp
        965   970   975

Met Ile Thr Trp Ile Leu Gln Met Phe Asp Thr Val Lys Arg Leu Arg
        980   985   990

Glu Lys Ser Cys Leu Val Val Ala Thr Thr Ser Gly Leu Glu Cys Ile
    995   1000   1005

Lys Ser Glu Glu Ile Thr His Asp Lys Glu Lys Ala Glu Arg Lys
    1010   1015   1020

Arg Lys Ala Glu Ala Ala Arg Leu His Arg Gln Lys Ile Met Ala
    1025   1030   1035

Gln Met Ser Ala Leu Gln Lys Asn Phe Ile Glu Thr His Lys Leu
    1040   1045   1050

Met Tyr Asp Asn Thr Ser Glu Val Thr Gly Lys Glu Asp Ser Ile
    1055   1060   1065

Met Glu Glu Glu Ser Thr Ser Ala Val Ser Glu Ala Ser Arg Ile
    1070   1075   1080

Ala Leu Gly Pro Lys Arg Gly Pro Ala Val Thr Glu Lys Glu Val
    1085   1090   1095

Leu Thr Cys Ile Leu Cys Gln Glu Glu Gln Glu Val Lys Leu Glu
    1100   1105   1110

Asn Asn Ala Met Val Leu Ser Ala Cys Val Gln Lys Ser Thr Ala
    1115   1120   1125

Leu Thr Gln His Arg Gly Lys Pro Val Asp His Leu Gly Glu Thr
    1130   1135   1140

Leu Asp Pro Leu Phe Met Asp Pro Asp Leu Ala His Gly Thr Tyr
    1145   1150   1155

```
Thr Gly  Ser Cys Gly His Val   Met His Ala Val Cys   Trp Gln Lys
    1160              1165                  1170

Tyr Phe  Glu Ala Val Gln Leu   Ser Ser Gln Gln Arg   Ile His Val
    1175              1180                  1185

Asp Leu  Phe Asp Leu Glu Ser   Gly Glu Tyr Leu Cys   Pro Leu Cys
    1190              1195                  1200

Lys Ser  Leu Cys Asn Thr Val   Ile Pro Ile Ile Pro   Leu Gln Pro
    1205              1210                  1215

Gln Lys  Ile Asn Ser Glu Asn   Ala Glu Ala Leu Ala   Gln Leu Leu
    1220              1225                  1230

Thr Leu  Ala Arg Trp Ile Gln   Thr Val Leu Ala Arg   Ile Ser Gly
    1235              1240                  1245

Tyr Asn  Ile Lys His Ala Lys   Gly Glu Ala Pro Ala   Val Pro Val
    1250              1255                  1260

Leu Phe  Asn Gln Gly Met Gly   Asp Ser Thr Phe Glu   Phe His Ser
    1265              1270                  1275

Ile Leu  Ser Phe Gly Val Gln   Ser Ser Val Lys Tyr   Ser Asn Ser
    1280              1285                  1290

Ile Lys  Glu Met Val Ile Leu   Phe Ala Thr Thr Ile   Tyr Arg Ile
    1295              1300                  1305

Gly Leu  Lys Val Pro Pro Asp   Glu Leu Asp Pro Arg   Val Pro Met
    1310              1315                  1320

Met Thr  Trp Ser Thr Cys Ala   Phe Thr Ile Gln Ala   Ile Glu Asn
    1325              1330                  1335

Leu Leu  Gly Asp Glu Gly Lys   Pro Leu Phe Gly Ala   Leu Gln Asn
    1340              1345                  1350

Arg Gln  His Ser Gly Leu Lys   Ala Leu Met Gln Phe   Ala Val Ala
    1355              1360                  1365

Gln Arg  Ala Thr Cys Pro Gln   Val Leu Ile His Lys   His Leu Ala
    1370              1375                  1380

Arg Leu  Leu Ser Val Ile Leu   Pro Asn Leu Gln Ser   Glu Asn Thr
    1385              1390                  1395

Pro Gly  Leu Leu Ser Val Asp   Leu Phe His Val Leu   Val Gly Ala
    1400              1405                  1410

Val Leu  Ala Phe Pro Ser Leu   Tyr Trp Asp Asp Thr   Val Asp Leu
    1415              1420                  1425

Gln Pro  Ser Pro Leu Ser Ser   Ser Tyr Asn His Leu   Tyr Leu Phe
    1430              1435                  1440

His Leu  Ile Thr Met Ala His   Met Leu Gln Ile Leu   Leu Thr Thr
    1445              1450                  1455

Asp Thr  Asp Leu Ser Pro Gly   Pro Pro Leu Ala Glu   Gly Glu Glu
    1460              1465                  1470
```

-43-

154

A

```
Asp Ser Glu Glu Ala Arg Cys Ala Ser Ala Phe Phe Val Glu Val
    1475            1480            1485

Ser Gln His Thr Asp Gly Leu Thr Gly Cys Gly Ala Pro Gly Trp
    1490            1495            1500

Tyr Leu Trp Leu Ser Leu Arg Asn Gly Ile Thr Pro Tyr Leu Arg
    1505            1510            1515

Cys Ala Ala Leu Leu Phe His Tyr Leu Leu Gly Val Ala Pro Pro
    1520            1525            1530

Glu Glu Leu Phe Ala Asn Ser Ala Glu Gly Glu Phe Ser Ala Leu
    1535            1540            1545

Cys Ser Tyr Leu Ser Leu Pro Thr Asn Leu Phe Leu Leu Phe Gln
    1550            1555            1560

Glu Tyr Trp Asp Thr Ile Arg Pro Leu Leu Gln Arg Trp Cys Gly
    1565            1570            1575

Asp Pro Ala Leu Leu Lys Ser Leu Lys Gln Lys Ser Ala Val Val
    1580            1585            1590

Arg Tyr Pro Arg Lys Arg Asn Ser Leu Ile Glu Leu Pro Glu Asp
    1595            1600            1605

Tyr Ser Cys Leu Leu Asn Gln Ala Ser His Phe Arg Cys Pro Arg
    1610            1615            1620

Ser Ala Asp Asp Glu Arg Lys His Pro Val Leu Cys Leu Phe Cys
    1625            1630            1635

Gly Ala Ile Leu Cys Ser Gln Asn Ile Cys Cys Gln Glu Ile Val
    1640            1645            1650

Asn Gly Glu Glu Val Gly Ala Cys Val Phe His Ala Leu His Cys
    1655            1660            1665

Gly Ala Gly Val Cys Ile Phe Leu Lys Ile Arg Glu Cys Arg Val
    1670            1675            1680

Val Leu Val Glu Gly Lys Ala Arg Gly Cys Ala Tyr Pro Ala Pro
    1685            1690            1695

Tyr Leu Asp Glu Tyr Gly Glu Thr Asp Pro Gly Leu Lys Arg Gly
    1700            1705            1710

Asn Pro Leu His Leu Ser Arg Glu Arg Tyr Arg Lys Leu His Leu
    1715            1720            1725

Val Trp Gln Gln His Cys Ile Ile Glu Glu Ile Ala Arg Ser Gln
    1730            1735            1740

Glu Thr Asn Gln Met Leu Phe Gly Phe Asn Trp Gln Leu Leu
    1745            1750            1755


<210>  16
<211>  11
<212>  PRT
<213>  Artificial sequence
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-44-

155

A

<220>
<223> Description of Artificial Sequence: peptide

<400> 16
Tyr Gly Arg Lys Lys Arg Arg Gln Arg Arg Arg
1   5   10

<210> 17
<211> 15
<212> PRT
<213> Artificial sequence

<220>
<223> Description of Artificial Sequence: peptide

<400> 17

Gly Gly Gly Gly Tyr Gly Arg Lys Lys Arg Arg Gln Arg Arg Arg
1   5   10   15

<210> 18
<211> 5205
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (662)
<223> n = A or T or G or C

<220>
<221> misc_feature
<222> (668)
<223> n = A or T or G or C

<400> 18
atggcggacg aggaggctgg aggtactgag aggatggaaa tcagcgcgga gttaccccag   60

accccctcagc gtctggcatc ttggtgggat cagcaagttg atttttatac tgctttcttg   120

catcatttgg cacaattggt gccagaaatt tactttgctg aaatggaccc agacttggaa   180

aagcaggagg aaagtgtaca atgtcaata ttcactccac tggaatggta cttatttgga   240

gaagatccag atatttgctt agagaaattg aagcacagtg gagcatttca gctttgtggg   300

agggttttca aaagtggaga gacaacctat tcttgcaggg attgtgcaat tgatccaaca   360

tgtgtactct gtatggactg cttccaggac agtgttcata aaaatcatcg ttacaagatg   420

catacttcta ctggaggagg gttctgtgac tgtggagaca cagaggcatg aaaactggc   480

cctttttgtg taaatcatga acctggaaga gcaggtacta taaaagagaa ttcacgctgt   540

ccgttgaatg aagaggtaat tgtccaagcc aggaaaatat ttccttcagt gataaaatat   600

gtcgtagaaa tgactatatg ggaagaggaa aaagaactgc ctcctgaact ccagataagg   660

knryycvndh hsydhgtcat atacagccta caaagagctc ttgactgtga gctcgcagag   720

gcccagttgc ataccactgc cattgacaaa gagggtcgtc gggctgttaa agcgggagct   780

-45-

156

A

```
tatgctgctt gccaggaagc aaaggaagat ataaagagtc attcagaaaa tgtctctcaa    840

catccacttc atgtagaagt attacactca gagattatgg ctcatcagaa atttgctttg    900

cgtcttggtt cctggatgaa caaaattatg agctattcaa gtgactttag gcagatcttt    960

tgccaagcat gccttagaga agaacctgac tcggagaatc cctgtctcat aagcaggtta   1020

atgctttggg atgcaaagct ttataaaggt gcccgtaaga tccttcatga attgatcttc   1080

agcagttttt ttatggagat ggaatacaaa aaactctttg ctatggaatt tgtgaagtat   1140

tataaacaac tgcagaaaga atatatcagt gatgatcatg acagaagtat ctctataact   1200

gcactttcag ttcagatgtt tactgttcct actctggctc gacatcttat tgaagagcag   1260

aatgttatct ctgtcattac tgaaactctg ctagaagttt tacctgagta cttggacagg   1320

aacaataaat tcaacttcca gggttatagc caggacaaat tgggaagagt atatgcagta   1380

atatgtgacc taaagtatat cctgatcagc aaacccacaa tatggacaga aagattaaga   1440

atgcagttcc ttgaaggttt tcgatctttt ttgaagattc ttacctgtat gcagggaatg   1500

gaagaaatcc gaagacaggt tgggcaacac attgaagtgg atcctgattg ggaggctgcc   1560

attgctatac agatgcaatt gaagaatatt ttactcatgt tccaagagtg gtgtgcttgt   1620

gatgaagaac tcttacttgt ggcttataaa gaatgtcaca aagctgtgat gaggtgcagt   1680

accagtttca tatctagtag caagacagta gtacaatcgt gtggacatag tttggaaaca   1740

aagtcctaca gagtatctga ggatcttgta agcatacatc tgccactctc taggaccctt   1800

gctggtcttc atgtacgttt aagcaggctg ggtgctgttt caagactgca tgaatttgtg   1860

tcttttgagg actttcaagt agaggtacta gtggaatatc ctttacgttg tctggtgttg   1920

gttgcccagg ttgttgctga gatgtggcga agaaatggac tgtctcttat tagccaggtg   1980

ttttattacc aagatgttaa gtgcagagaa gaaatgtatg ataaagatat catcatgctt   2040

cagattggtg catctttaat ggatcccaat aagttcttgt tactggtact tcagaggtat   2100

gaacttgccg aggcttttaa caagaccata tctacaaaag accaggattt gattaaacaa   2160

tataatacac aatagaagaa aatgcttcag gtcctcatct atattgtggg tgagcgttat   2220

gtacctggag tgggaaatgt gaccaaagaa gaggtcacaa tgagagaaat cattcacttg   2280

ctttgcattg aacccatgcc acacagtgcc attgccaaaa atttacctga gaatgaaaat   2340

aatgaaactg cttagagaa tgtcataaac aaagtggcca catttaagaa accaggtgta   2400

tcaggccatg gagtttatga actaaaagat gaatcactga aagacttcaa tatgtacttt   2460

tatcattact ccaaaaccca gcatagcaag gctgaacata tgcagaagaa aaggagaaaa   2520

caagaaaaca aagatgaagc attgccgcca ccaccacctc ctgaattctg ccctgctttc   2580

agcaaagtga ttaaccttct caactgtgat atcatgatgt acattctcag gaccgtattt   2640

gagcgggcaa tagacacaga ttctaacttg tggaccgaag ggatgctcca aatggctttt   2700
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-46-

157

A

```
catattctgg cattgggttt actagaagag aagcaacagc ttcaaaaagc tcctgaagaa    2760

gaagtaacat ttgactttta tcataaggct tcaagattgg gaagttcagc catgaatata    2820

caaatgcttt tggaaaaact caaaggaatt ccccagttag aaggccagaa ggacatgata    2880

acgtggatac ttcagatgtt tgacacagtg aagcgattaa gagaaaaatc ttgtttaatt    2940

gtagcaacca catcaggatc ggaatctatt aagaatgatg agattactca tgataaagaa    3000

aaagcagaac gaaaaagaaa agctgaagct gctaggctac atcgccagaa gatcatggct    3060

cagatgtctg ccttacagaa aaacttcatt gaaactcata aactcatgta tgacaataca    3120

tcagaaatgc ctgggaaaga agattccatt atggaggaag agagcacccc agcagtcagt    3180

gactactcta gaattgcttt gggtcctaaa cggggtccat ctgttactga aaaggaggtg    3240

ctgacgtgca tcctttgcca agaagaacag gaggtgaaaa tagaaaataa tgccatggta    3300

ttatcggcct gtgtccagaa atctactgcc ttaacccagc acaggggaaa acccatagaa    3360

ctctcaggag aagccctaga cccacttttc atggatccag acttggcata tggaacttat    3420

acaggaagct gtggtcatgt aatgcacgca gtgtgctggc agaagtattt tgaagctgta    3480

cagctgagct ctcagcagcg cattcatgtt gacctttttg acttggaaag tggagaatat    3540

ctttgccctc tttgcaaatc tctgtgcaat actgtgatcc ccattattcc tttgcaacct    3600

caaaagataa acagtgagaa tgcagatgct cttgctcaac ttttgaccct ggcacggtgg    3660

atacagactg ttctggccag aatatcaggt tataatataa gacatgctaa aggagaaaac    3720

ccaattccta ttttctttaa tcaaggaatg ggagattcta ctttggagtt ccattccatc    3780

ctgagttttg gcgttgagtc ttcgattaaa tattcaaata gcatcaagga aatggttatt    3840

ctctttgcca caacaattta tagaattgga ttgaaagtgc cacctgatga aagggatcct    3900

cgagtcccca tgctgacctg gagcacctgc gctttcacta tccaggcaat tgaaaatcta    3960

ttgggagatg aaggaaaacc tctgtttgga gcacttcaaa ataggcagca taatggtctg    4020

aaagcattaa tgcagtttgc agttgcacag aggattacct gtcctcaggt cctgatacag    4080

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ctttatctct tccatttgat caccatggca cacatgcttc agatactact tacagtagac    4320

acaggcctac cccttgctca ggttcaagaa gacagtgaag aggctcattc cgcatcttct    4380

ttctttgcag aaatttctca atatacaagt ggctccattg ggtgtgatat tcctggctgg    4440

tatttgtggg tctcactgaa gaatggcatc accccttatc ttcgctgtgc tgcattgttt    4500

ttccactatt tacttggggt aactccgcct gaggaactgc ataccaattc tgcagaagga    4560

gagtacagtg cactctgtag ctatctatct ttacctacaa atttgttcct gctcttccag    4620
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-47-

158

A

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gaatattggg atactgtaag gcccttgctc cagaggcggt gtgcagatcc tgccttacta    4680

aactgtttga agcaaaaaaa caccgtggtc aggtacccta gaaaaagaaa tagtttgata    4740

gagcttcctg atgactatag ctgcctcctg aatcaagctt ctcatttcag gtgcccacgg    4800

tctgcagatg atgagcgaaa gcatcctgtc ctctgccttt tctgtggggc tatactatgt    4860

tctcagaaca tttgctgcca ggaaattgtg aacggggaag aggttggagc ttgcattttt    4920

cacgcacttc actgtggagc cggagtctgc attttcctaa aaatcagaga atgccgagtg    4980

gtcctggttg aaggtaaagc cagaggctgt gcctatccag ctccttactt ggatgaatat    5040

ggagaaacag accctggcct gaagaggggc aacccccttc atttatctcg tgagcggtat    5100

cggaagctcc atttggtctg gcaacaacac tgcattatag aagagattgc taggagccaa    5160

gagactaatc agatgttatt tggattcaac tggcagttac tgtga                   5205
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<210> 19
<211> 1734
<212> PRT
<213> Homo sapiens

<400> 19

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Ala Met Glu Gly Asn Met Ala Asp Glu Glu Ala Gly Gly Thr Glu Arg
1               5                   10                  15

Met Glu Ile Ser Ala Glu Leu Pro Gln Thr Pro Gln Arg Leu Ala Ser
            20                  25                  30

Trp Trp Asp Gln Gln Val Asp Phe Tyr Thr Ala Phe Leu His His Leu
        35                  40                  45

Ala Gln Leu Val Pro Glu Ile Tyr Phe Ala Glu Met Asp Pro Asp Leu
    50                  55                  60

Glu Lys Gln Glu Glu Ser Val Gln Met Ser Ile Phe Thr Pro Leu Glu
65                  70                  75                  80

Trp Tyr Leu Phe Gly Glu Asp Pro Asp Ile Cys Leu Glu Lys Leu Lys
                85                  90                  95

His Ser Gly Ala Phe Gln Leu Cys Gly Arg Val Phe Lys Ser Gly Glu
            100                 105                 110

Thr Thr Tyr Ser Cys Arg Asp Cys Ala Ile Asp Pro Thr Cys Val Leu
            115                 120                 125

Cys Met Asp Cys Phe Gln Asp Ser Val His Lys Asn His Arg Tyr Lys
    130                 135                 140

Met His Thr Ser Thr Gly Gly Gly Phe Cys Asp Cys Gly Asp Thr Glu
145                 150                 155                 160

Ala Trp Lys Thr Gly Pro Phe Cys Val Asn His Glu Pro Gly Arg Ala
                165                 170                 175

Gly Thr Ile Lys Glu Asn Ser Arg Cys Pro Leu Asn Glu Glu Val Ile
            180                 185                 190
```

-48-

159

A

```
Val Gln Ala Arg Lys Ile Phe Pro Ser Val Ile Lys Tyr Val Val Glu
        195                 200                 205

Met Thr Ile Trp Glu Glu Glu Lys Glu Leu Pro Pro Glu Leu Gln Ile
    210             215                 220

Arg Glu Lys Asn Glu Arg Tyr Tyr Cys Val Leu Phe Asn Asp Glu His
225                 230                 235                 240

His Ser Tyr Asp His Val Ile Tyr Ser Leu Gln Arg Ala Leu Asp Cys
                245                 250                 255

Glu Leu Ala Glu Ala Gln Leu His Thr Thr Ala Ile Asp Lys Glu Gly
            260                 265                 270

Arg Arg Ala Val Lys Ala Gly Ala Tyr Ala Ala Cys Gln Glu Ala Lys
            275                 280                 285

Glu Asp Ile Lys Ser His Ser Glu Asn Val Ser Gln His Pro Leu His
    290                 295                 300

Val Glu Val Leu His Ser Glu Ile Met Ala His Gln Lys Phe Ala Leu
305                 310                 315                 320

Arg Leu Gly Ser Trp Met Asn Lys Ile Met Ser Tyr Ser Ser Asp Phe
            325                 330                 335

Arg Gln Ile Phe Cys Gln Ala Cys Leu Arg Glu Glu Pro Asp Ser Glu
            340                 345                 350

Asn Pro Cys Leu Ile Ser Arg Leu Met Leu Trp Asp Ala Lys Leu Tyr
        355                 360                 365

Lys Gly Ala Arg Lys Ile Leu His Glu Leu Ile Phe Ser Ser Phe Phe
    370                 375                 380

Met Glu Met Glu Tyr Lys Lys Leu Phe Ala Met Glu Phe Val Lys Tyr
385                 390                 395                 400

Tyr Lys Gln Leu Gln Lys Glu Tyr Ile Ser Asp Asp His Asp Arg Ser
            405                 410                 415

Ile Ser Ile Thr Ala Leu Ser Val Gln Met Phe Thr Val Pro Thr Leu
            420                 425                 430

Ala Arg His Leu Ile Glu Glu Gln Asn Val Ile Ser Val Ile Thr Glu
            435                 440                 445

Thr Leu Leu Glu Val Leu Pro Glu Tyr Leu Asp Arg Asn Asn Lys Phe
    450                 455                 460

Asn Phe Gln Gly Tyr Ser Gln Asp Lys Leu Gly Arg Val Tyr Ala Val
465                 470                 475                 480

Ile Cys Asp Leu Lys Tyr Ile Leu Ile Ser Lys Pro Thr Ile Trp Thr
            485                 490                 495

Glu Arg Leu Arg Met Gln Phe Leu Glu Gly Phe Arg Ser Phe Leu Lys
            500                 505                 510

Ile Leu Thr Cys Met Gln Gly Met Glu Glu Ile Arg Arg Gln Val Gly
            515                 520                 525
```

-49-

160

```
Gln His Ile Glu Val Asp Pro Asp Trp Glu Ala Ala Ile Ala Ile Gln
    530                 535             540
Met Gln Leu Lys Asn Ile Leu Leu Met Phe Gln Glu Trp Cys Ala Cys
545                 550             555                 560
Asp Glu Glu Leu Leu Leu Val Ala Tyr Lys Glu Cys His Lys Ala Val
                565             570             575
Met Arg Cys Ser Thr Ser Phe Ile Ser Ser Ser Lys Thr Val Val Gln
            580             585             590
Ser Cys Gly His Ser Leu Glu Thr Lys Ser Tyr Arg Val Ser Glu Asp
        595             600             605
Leu Val Ser Ile His Leu Pro Leu Ser Arg Thr Leu Ala Gly Leu His
    610             615             620
Val Arg Leu Ser Arg Leu Gly Ala Val Ser Arg Leu His Glu Phe Val
625             630             635             640
Ser Phe Glu Asp Phe Gln Val Glu Val Leu Val Glu Tyr Pro Leu Arg
            645             650             655
Cys Leu Val Leu Val Ala Gln Val Val Ala Glu Met Trp Arg Arg Asn
            660             665             670
Gly Leu Ser Leu Ile Ser Gln Val Phe Tyr Tyr Gln Asp Val Lys Cys
            675             680             685
Arg Glu Glu Met Tyr Asp Lys Asp Ile Ile Met Leu Gln Ile Gly Ala
    690             695             700
Ser Leu Met Asp Pro Asn Lys Phe Leu Leu Leu Val Leu Gln Arg Tyr
705             710             715             720
Glu Leu Ala Glu Ala Phe Asn Lys Thr Ile Ser Thr Lys Asp Gln Asp
            725             730             735
Leu Ile Lys Gln Tyr Asn Thr Leu Ile Glu Glu Met Leu Gln Val Leu
            740             745             750
Ile Tyr Ile Val Gly Glu Arg Tyr Val Pro Gly Val Gly Asn Val Thr
        755             760             765
Lys Glu Glu Val Thr Met Arg Glu Ile Ile His Leu Leu Cys Ile Glu
    770             775             780
Pro Met Pro His Ser Ala Ile Ala Lys Asn Leu Pro Glu Asn Glu Asn
785             790             795             800
Asn Glu Thr Gly Leu Glu Asn Val Ile Asn Lys Val Ala Thr Phe Lys
            805             810             815
Lys Pro Gly Val Ser Gly His Gly Val Tyr Glu Leu Lys Asp Glu Ser
            820             825             830
Leu Lys Asp Phe Asn Met Tyr Phe Tyr His Tyr Ser Lys Thr Gln His
        835             840             845
Ser Lys Ala Glu His Met Gln Lys Lys Arg Arg Lys Gln Glu Asn Lys
    850             855             860
```

-50-

161

A

```
Asp Glu Ala Leu Pro Pro Pro Pro Pro Pro Glu Phe Cys Pro Ala Phe
865             870         875             880

Ser Lys Val Ile Asn Leu Leu Asn Cys Asp Ile Met Met Tyr Ile Leu
            885             890             895

Arg Thr Val Phe Glu Arg Ala Ile Asp Thr Asp Ser Asn Leu Trp Thr
        900             905             910

Glu Gly Met Leu Gln Met Ala Phe His Ile Leu Ala Leu Gly Leu Leu
    915             920             925

Glu Glu Lys Gln Gln Leu Gln Lys Ala Pro Glu Glu Glu Val Thr Phe
    930             935             940

Asp Phe Tyr His Lys Ala Ser Arg Leu Gly Ser Ser Ala Met Asn Ile
945             950             955             960

Gln Met Leu Leu Glu Lys Leu Lys Gly Ile Pro Gln Leu Glu Gly Gln
            965             970             975

Lys Asp Met Ile Thr Trp Ile Leu Gln Met Phe Asp Thr Val Lys Arg
            980             985             990

Leu Arg Glu Lys Ser Cys Leu Ile  Val Ala Thr Thr Ser  Gly Ser Glu
        995             1000            1005

Ser Ile  Lys Asn Asp Glu Ile  Thr His Asp Lys Glu  Lys Ala Glu
    1010            1015            1020

Arg Lys  Arg Lys Ala Glu Ala  Ala Arg Leu His Arg  Gln Lys Ile
    1025            1030                1035

Met Ala  Gln Met Ser Ala Leu  Gln Lys Asn Phe Ile  Glu Thr His
    1040                1045            1050

Lys Leu  Met Tyr Asp Asn Thr  Ser Glu Met Pro Gly  Lys Glu Asp
    1055            1060            1065

Ser Ile  Met Glu Glu Glu Ser  Thr Pro Ala Val Ser  Asp Tyr Ser
    1070            1075            1080

Arg Ile  Ala Leu Gly Pro Lys  Arg Gly Pro Ser Val  Thr Glu Lys
    1085            1090            1095

Glu Val  Leu Thr Cys Ile Leu  Cys Gln Glu Glu Gln  Glu Val Lys
    1100            1105            1110

Ile Glu  Asn Asn Ala Met Val  Leu Ser Ala Cys Val  Gln Lys Ser
    1115            1120            1125

Thr Ala  Leu Thr Gln His Arg  Gly Lys Pro Ile Glu  Leu Ser Gly
    1130            1135            1140

Glu Ala  Leu Asp Pro Leu Phe  Met Asp Pro Asp Leu  Ala Tyr Gly
    1145            1150            1155

Thr Tyr  Thr Gly Ser Cys Gly  His Val Met His Ala  Val Cys Trp
    1160            1165            1170

Gln Lys  Tyr Phe Glu Ala Val  Gln Leu Ser Ser Gln  Gln Arg Ile
    1175            1180            1185
```

-51-

162

A

```
His Val Asp Leu Phe Asp Leu  Glu Ser Gly Glu Tyr  Leu Cys Pro
    1190                1195              1200

Leu Cys Lys Ser Leu Cys Asn  Thr Val Ile Pro Ile  Ile Pro Leu
    1205                1210              1215

Gln Pro Gln Lys Ile Asn Ser  Glu Asn Ala Asp Ala  Leu Ala Gln
    1220                1225              1230

Leu Leu Thr Leu Ala Arg Trp  Ile Gln Thr Val Leu  Ala Arg Ile
    1235                1240              1245

Ser Gly Tyr Asn Ile Arg His  Ala Lys Gly Glu Asn  Pro Ile Pro
    1250                1255              1260

Ile Phe Phe Asn Gln Gly Met  Gly Asp Ser Thr Leu  Glu Phe His
    1265                1270              1275

Ser Ile Leu Ser Phe Gly Val  Glu Ser Ser Ile Lys  Tyr Ser Asn
    1280                1285              1290

Ser Ile Lys Glu Met Val Ile  Leu Phe Ala Thr Thr  Ile Tyr Arg
    1295                1300              1305

Ile Gly Leu Lys Val Pro Pro  Asp Glu Arg Asp Pro  Arg Val Pro
    1310                1315              1320

Met Leu Thr Trp Ser Thr Cys  Ala Phe Thr Ile Gln  Ala Ile Glu
    1325                1330              1335

Asn Leu Leu Gly Asp Glu Gly  Lys Pro Leu Phe Gly  Ala Leu Gln
    1340                1345              1350

Asn Arg Gln His Asn Gly Leu  Lys Ala Leu Met Gln  Phe Ala Val
    1355                1360              1365

Ala Gln Arg Ile Thr Cys Pro  Gln Val Leu Ile Gln  Lys His Leu
    1370                1375              1380

Val Arg Leu Leu Ser Val Val  Leu Pro Asn Ile Lys  Ser Glu Asp
    1385                1390              1395

Thr Pro Cys Leu Leu Ser Ile  Asp Leu Phe His Val  Leu Val Gly
    1400                1405              1410

Ala Val Leu Ala Phe Pro Ser  Leu Tyr Trp Asp Asp  Pro Val Asp
    1415                1420              1425

Leu Gln Pro Ser Ser Val Ser  Ser Ser Tyr Asn His  Leu Tyr Leu
    1430                1435              1440

Phe His Leu Ile Thr Met Ala  His Met Leu Gln Ile  Leu Leu Thr
    1445                1450              1455

Val Asp Thr Gly Leu Pro Leu  Ala Gln Val Gln Glu  Asp Ser Glu
    1460                1465              1470

Glu Ala His Ser Ala Ser Ser  Phe Phe Ala Glu Ile  Ser Gln Tyr
    1475                1480              1485

Thr Ser Gly Ser Ile Gly Cys  Asp Ile Pro Gly Trp  Tyr Leu Trp
    1490                1495              1500
```

-52-

163

```
Val Ser  Leu Lys Asn Gly Ile  Thr Pro Tyr Leu Arg  Cys Ala Ala
    1505             1510             1515

Leu Phe  Phe His Tyr Leu Leu  Gly Val Thr Pro Pro  Glu Glu Leu
    1520             1525             1530

His Thr  Asn Ser Ala Glu Gly  Glu Tyr Ser Ala Leu  Cys Ser Tyr
    1535             1540             1545

Leu Ser  Leu Pro Thr Asn Leu  Phe Leu Leu Phe Gln  Glu Tyr Trp
    1550             1555             1560

Asp Thr  Val Arg Pro Leu Leu  Gln Arg Arg Cys Ala  Asp Pro Ala
    1565             1570             1575

Leu Leu  Asn Cys Leu Lys Gln  Lys Asn Thr Val Val  Arg Tyr Pro
    1580             1585             1590

Arg Lys  Arg Asn Ser Leu Ile  Glu Leu Pro Asp Asp  Tyr Ser Cys
    1595             1600             1605

Leu Leu  Asn Gln Ala Ser His  Phe Arg Cys Pro Arg  Ser Ala Asp
    1610             1615             1620

Asp Glu  Arg Lys His Pro Val  Leu Cys Leu Phe Cys  Gly Ala Ile
    1625             1630             1635

Leu Cys  Ser Gln Asn Ile Cys  Cys Gln Glu Ile Val  Asn Gly Glu
    1640             1645             1650

Glu Val  Gly Ala Cys Ile Phe  His Ala Leu His Cys  Lys Ala Arg
    1655             1660             1665

Gly Cys  Ala Tyr Pro Ala Pro  Tyr Leu Asp Glu Tyr  Gly Glu Thr
    1670             1675             1680

Asp Pro  Gly Leu Lys Arg Gly  Asn Pro Leu His Leu  Ser Arg Glu
    1685             1690             1695

Arg Tyr  Arg Lys Leu His Leu  Val Trp Gln Gln His  Cys Ile Ile
    1700             1705             1710

Glu Glu  Ile Ala Arg Ser Gln  Glu Thr Asn Gln Met  Leu Phe Gly
    1715             1720             1725

Phe Asn  Trp Gln Leu Leu
    1730


<210>  20
<211>  22
<212>  DNA
<213>  Artificial sequence

<220>
<223>  Description of Artificial Sequence: PCR Primer

<400>  20
agaaggagag tacagtgcac tc                                                    22


<210>  21
<211>  20
```

164

A

<212> DNA
<213> Artificial sequence

<220>
<223> Description of Artificial Sequence: PCR Primer

<400> 21
cgaaagcatc ctgtcctctg   20

<210> 22
<211> 18
<212> DNA
<213> Artificial sequence

<220>
<223> Description of Artificial Sequence: PCR Primer

<400> 22
aggaagctgt ggtcatgt   18

<210> 23
<211> 14
<212> DNA
<213> Artificial sequence

<220>
<223> Description of Artificial Sequence: PCR Primer

<400> 23
gttaggaaga actg   14

<210> 24
<211> 20
<212> DNA
<213> Artificial sequence

<220>
<223> Description of Artificial Sequence: PCR Primer

<400> 24
aagaacagcg aaggcaacag   20

<210> 25
<211> 22
<212> DNA
<213> Artificial sequence

<220>
<223> Description of Artificial Sequence: PCR Primer

<400> 25
cgcagctacc ccaacacatt ct   22

<210> 26
<211> 22

165

A

```
<212>   DNA
<213>   Artificial sequence

<220>
<223>   Description of Artificial Sequence: PCR Primer

<400>   26
tttcttccat tccctgcata ca                                        22


<210>   27
<211>   25
<212>   DNA
<213>   Artificial sequence



<220>
<223>   Description of Artificial Sequence: PCR Primer

<400>   27
caaaacttta taaaggtgcc cgtaa                                     25


<210>   28
<211>   23
<212>   DNA
<213>   Artificial sequence

<220>
<223>   Description of Artificial Sequence: PCR Primer

<400>   28
attccctgca tgcacttcag taa                                       23


<210>   29
<211>   21
<212>   DNA
<213>   Artificial sequence

<220>
<223>   Description of Artificial Sequence: PCR Primer

<400>   29
cattccctgc atgcacttca g                                         21
```

166